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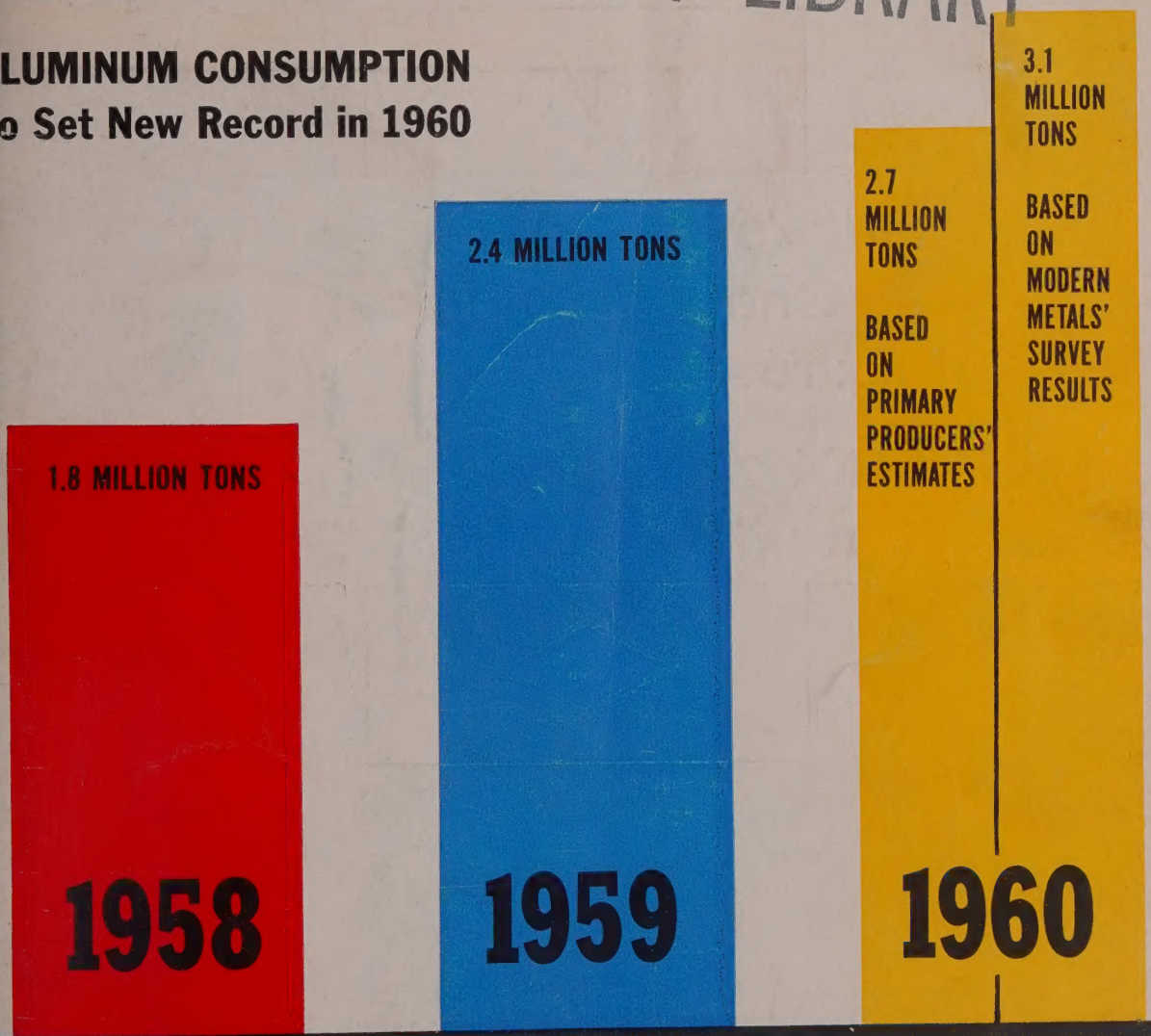
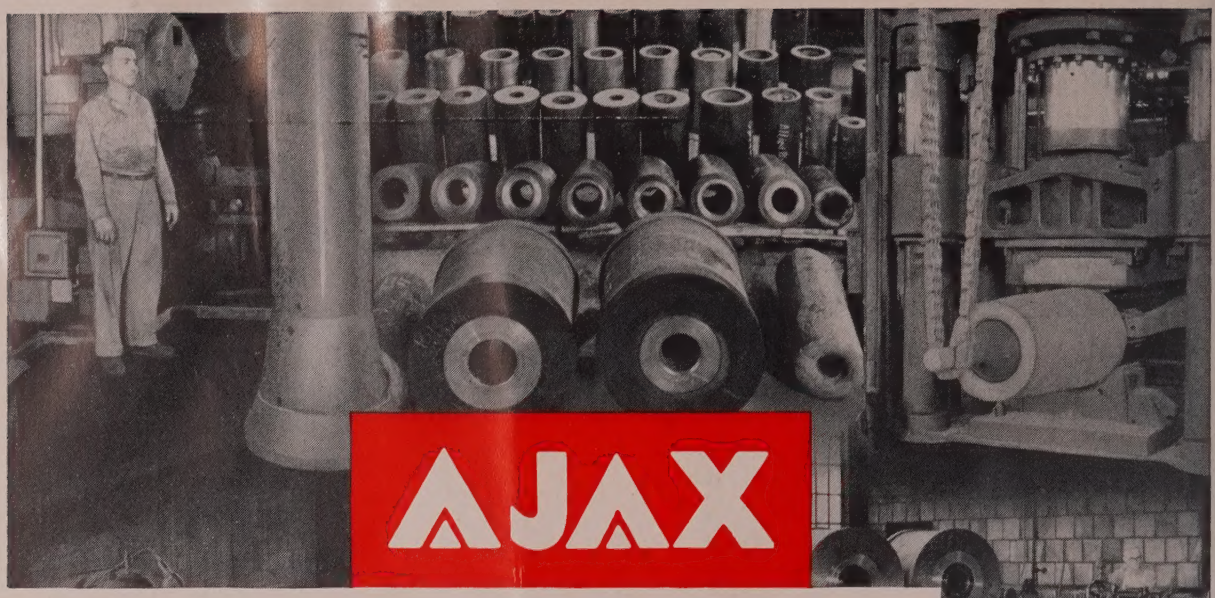
ALUMINUM CONSUMPTION To Set New Record in 1960



Aluminum shipments in 1959 soared 35% over last year; may hit record 3 million-ton level in 1960. Stronger demand and higher prices will stabilize the industry and spur more expansion in the sixties.

(See survey, page 74.)



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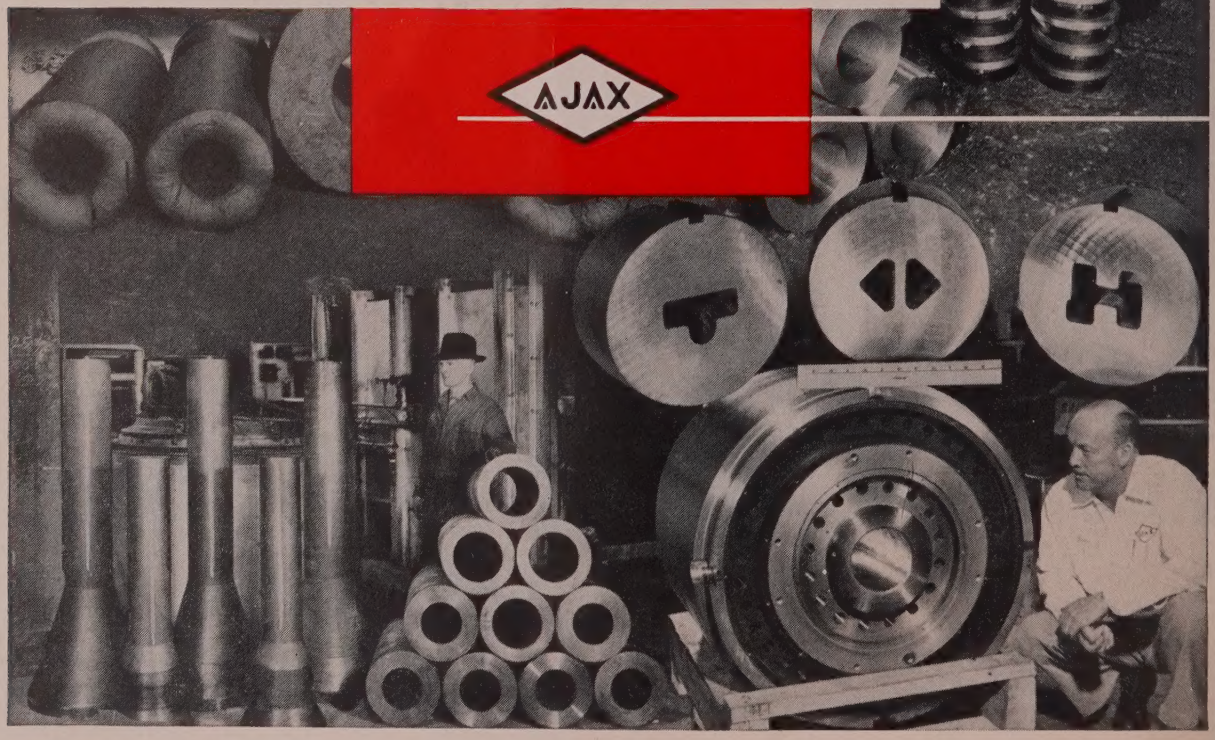

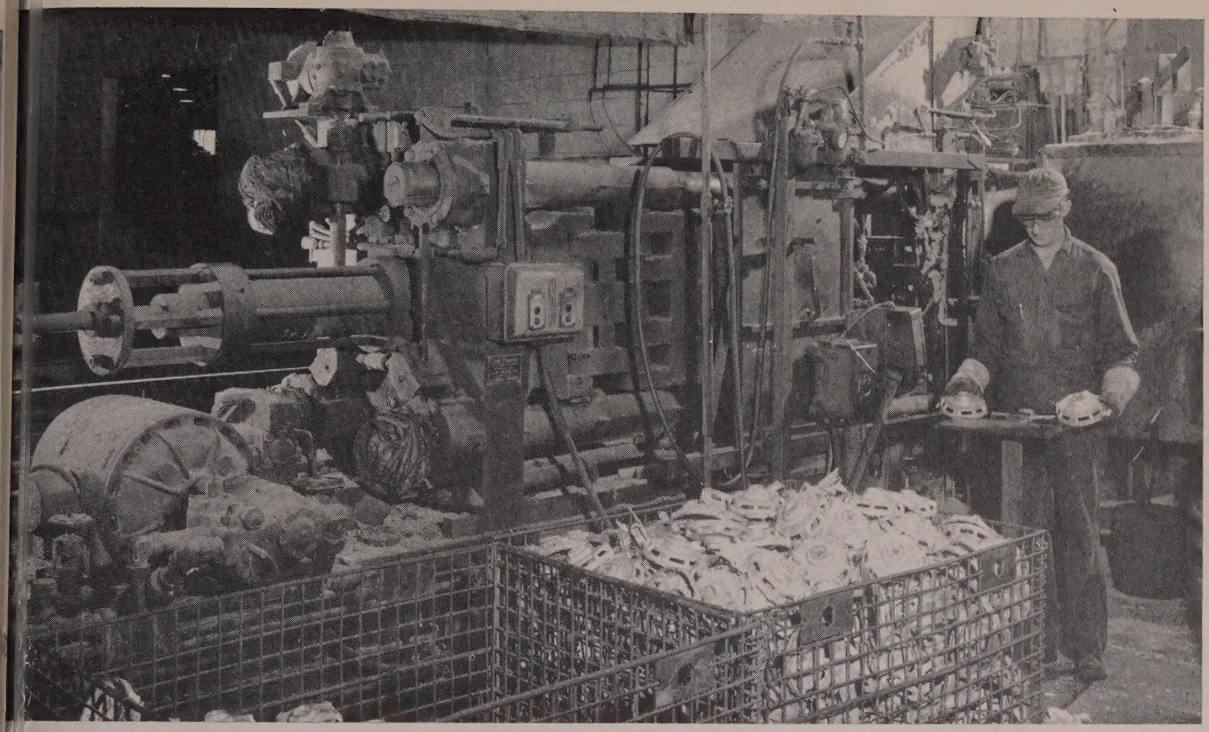

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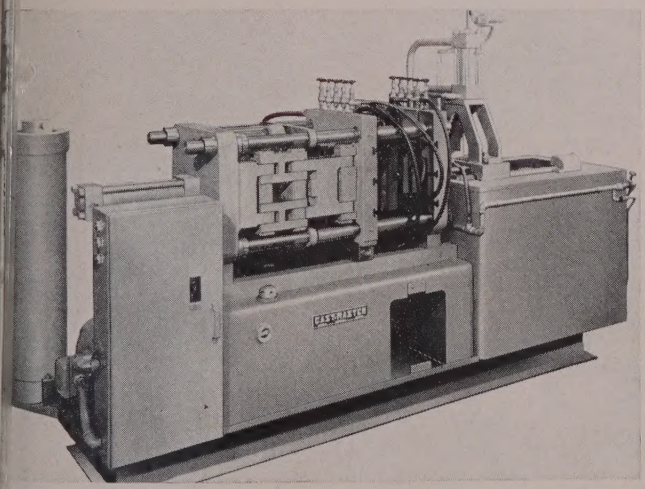
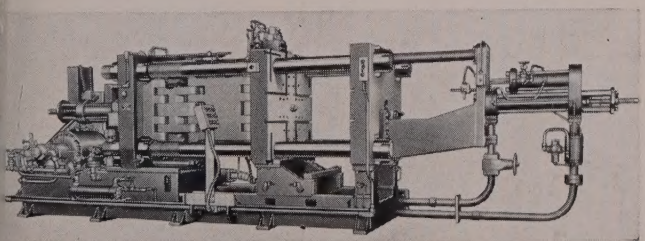


ODEL 7Z 100-ton hot chamber automatic for high speed production f small castings.



ODEL 40A 800-ton cold chamber Cast-Master for heavy outsize castings nd heavy duty operation.

The "big yardstick" for die casting machines is performance. That's why 365 repeat orders for Cast-Master Die Casting Machines are mute testimony to performance, *plus!* Of the hundreds who use these versatile machines, the great majority own more than one; in the above instance, as many as 45.

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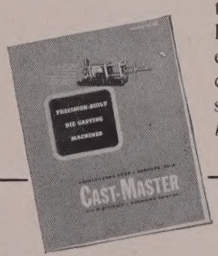

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How to select the right aluminum alloy for screw machining

Suitable Aluminum Alloys: Since aluminum can be cut at exceptionally high speeds and feeds, a high production rate is assured. The principal alloys used in automatic screw machines are 2011-T3, 2017-T4, 2024-T4, and 6061-T6.

2011-T3 Of these, 2011-T3 is considered superior. It has lead and bismuth added to speed machining, improve the finish of the machined part, and create a finely divided chip. This alloy is specifically recommended for a broad range of screw machine products.

2017-T4 Alloy 2017-T4 offers greater corrosion resistance and ductility than 2011-T3 and is often suggested for parts which require mechanical operations after machining. It is selected frequently for rivets and products requiring deep drilled holes.

2024-T4 The 2024-T4 alloy has higher mechanical properties than 2011-T3 or 2017-T4 and is widely used for aircraft fittings. Because of its relatively high shear strength, many rivets and threaded fasteners are made from it.

6061-T6 Although 6061-T6 has somewhat lesser mechanical properties and a lower machinability rating than the foregoing alloys, it has superior corrosion resistance and is more suitable for brazing, soldering and fusion welding. This alloy also gives a better finish when anodized. Tools for machining 6061-T6 require larger rake angles since the chips are less brittle and have a tendency to buildup on the cutting edge. The nonheat-treatable alloys such as 3003 and 5052 in their hard tempers are not as free-cutting as the above-mentioned heat-treated alloys, but they are readily cut with a large rake angle. To induce favorable chip formation, chip breakers or chip curlers are recommended for the cutting tool.

SPEEDS AND FEEDS

High machining speeds with moderate feeds and depth of cut are recommended for aluminum screw machine stock. Speeds of up to 700 surface feet per minute and more, with feeds up to about 0.020 inch and 0.250 inch depth of cut are customary.

COSTS

Keep in mind that aluminum must be compared on the basis of price per piece instead of price per pound when figuring material costs. Remember a pound of aluminum will yield three times as many pieces as a pound of most other metals.

CUTTING TOOL LUBRICANTS

The high rate of metal removal when automatic screw machining aluminum makes it desirable to use a high volume of low viscosity cutting fluid or lubricant under low pressure, carefully directed to hit the tool and work to carry away as much heat as possible. Lighter oils flow over the work more readily and thus can be expected to remove heat faster.

Mineral oils with a viscosity of not more than 100 seconds Saybolt Universal (at 100°F) are recommended. Water soluble oils also work well on machines where seepage of the lubricating oils can be controlled. Soluble oils have the advantage of removing heat faster than usual mineral oils.

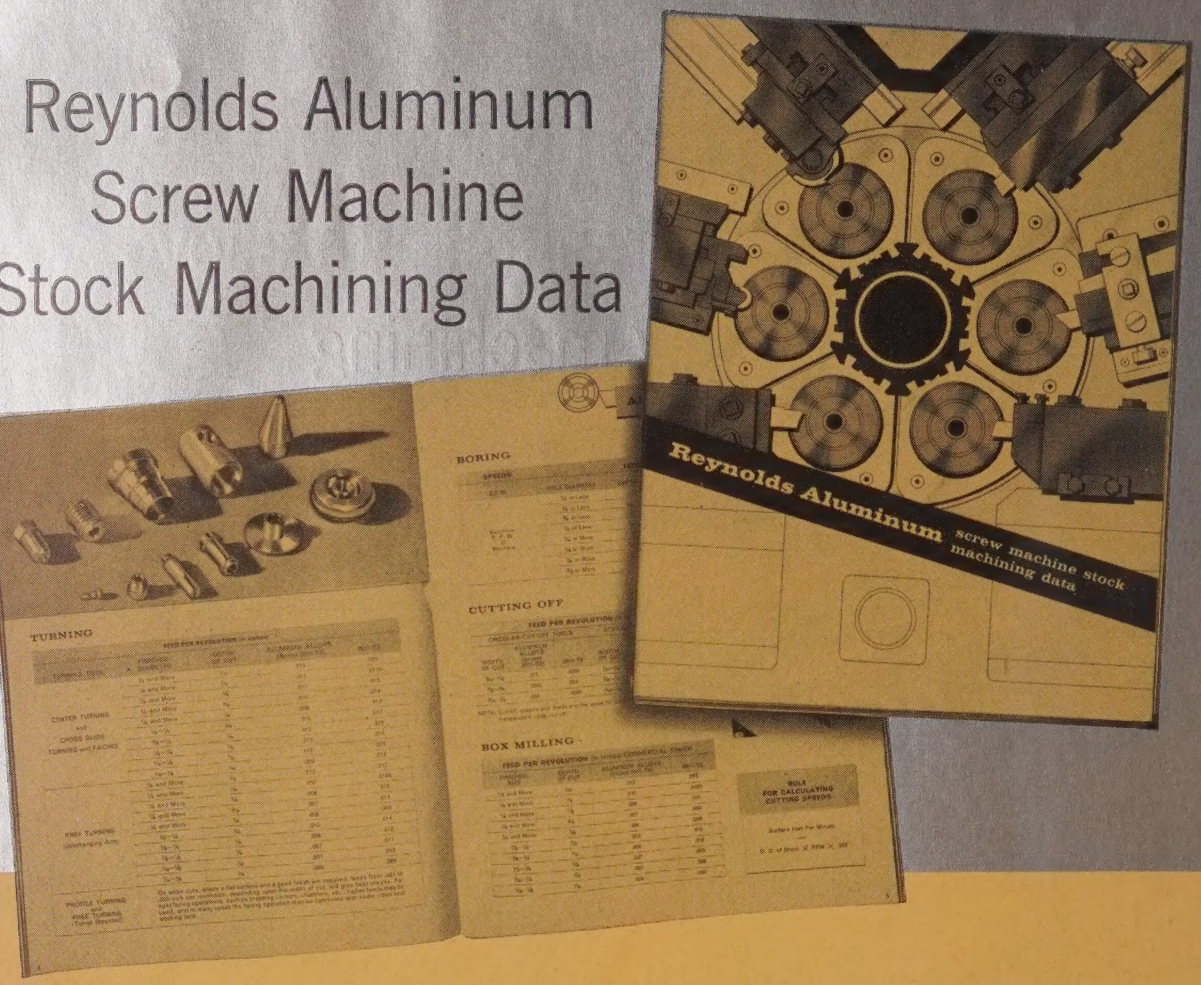
For exacting jobs, use oils especially designed for work with aluminum. They usually consist of a light mineral oil with 5-10 percent of fatty additions (such as oleic acid, lard oil, or neatsfoot oil) with a viscosity of 45-65 seconds Saybolt Universal at 100°F.

All aluminum alloys have good machinability but in the interest of efficiency it is desirable to design tools and specify cutting conditions tailored to each alloy.

And, to be sure you get the right aluminum—use Reynolds Aluminum

FREE booklet on Reynolds Aluminum Screw Machine Stock Machining Data—see next page. →

Reynolds Aluminum Screw Machine Stock Machining Data



Add to your Technical Library with this new informative booklet

This fact-packed 12-page booklet details the proper speeds and feeds for turning, forming, threading, cutting and knurling—plus tables, charts and illustrations. Invaluable for the engineer and metal worker.

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Read in companies that produce, fabricate and cast aluminum, magnesium and titanium, and firms that use these metals in manufacturing end products.

ON THE COVER: The extent of aluminum's recovery from the slump of 1957-58 is graphically illustrated on this month's cover, along with two separate projections for next year. Averaging the primary producers' forecasts, the gain in aluminum use next year would be 12.5% to 2.7 million tons. If the 33% increase indicated by our survey results proves out, consumption would soar to around 3.1 million tons. We think it will be somewhere between these two — more like a 20% gain to around 2.9 million tons. For the survey results, see page 74.

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Modern Metals has by far the world's largest circulation among light metals fabricators, foundries and product manufacturers who use aluminum, magnesium, and titanium. Circulation: Now over 14,000 copies per month. Acceptance under controlled circulation at Barrington, Ill.

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Modern Metals

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Magnesium Association paper cites military and commercial uses as the super-light metal emerges from developmental stage into marketing stage.

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Seeking new and bigger outlets for sheet, primary producers have brought out two new items. Independent rollers could be hurt by low-priced products.

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Modern Metals poll of over 2000 metalworking plants indicates that 339 firms will use 33% more aluminum next year. Extensive expansion and new product plans also reported in questionnaire replies.

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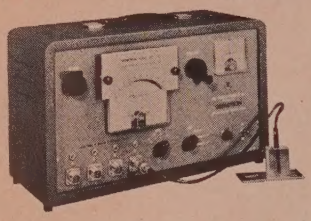

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Letters

Extrusion Man Needed In Mexico

Sirs:

In your October 1959 issue, we read an advertisement offering the services of an extrusion superintendent. We are operating an aluminum extrusion plant in Monterrey, Mexico, where we have a new 900-ton Watson-Stillman press.

We request that you put us in contact with the interested party, explaining to the person that we are considering using the services of such a person — for one month — for the purpose of training our personnel in the operation of the above mentioned equipment, and mainly with respect to designing, making and correcting extrusion dies.

"I" — Mexico

MM —Well, Senor, we sent the man a copy of your letter. If you haven't heard from him, don't be too surprised because your requirements are somewhat overpowering for one man.

There are plenty of people who can put an extrusion press into operation, design dies, make them, and do die correction work, but to train a crew for these jobs takes a little longer than a month — or a year — unless you have personnel who are already experiencd.

If you need help in all of these directions, you'd better get yourself a manager on a permanent basis.

Needs Aluminum Discs

Sirs:

We are interested in finding a supplier for aluminum discs, 2¼" OD, either with or without a 3/16" diameter hole in the center.

We have been using a .102" thick 24ST6 aluminum. As these discs are the ends or bearing plates for our readi-rods, any aluminum alloy with similar strength will be satisfactory.

"J" — Ohio

MM — We have sent you our Light Metals Buyers Directory which lists every major source for sheet, discs — in fact, you name it in aluminum. Our next buyers directory will appear in the February issue.

On Finishing Aluminum

Sirs:

Your September issue on "How to Finish Aluminum" was the best thing to hit our shop in a long time. It has caused some of our engineers to suggest that you devote future issues to a single subject, as important as finishing. . . .

We can put about fifty reprints to good use around here, so please send them with the invoice as soon as you can.

"J" — California

Aluminum And Building

Sirs:

We were impressed with your November issue featuring innovations for aluminum in the building industry—particularly your estimate that total aluminum consumption will jump from 550,000 tons this year to 750,000 tons in 1960. This advance, in the face of an overall reduction in housing starts next year, must mean that a lot of

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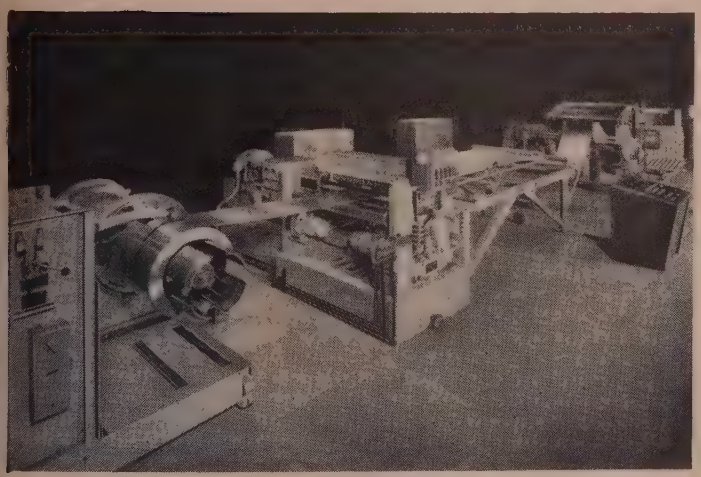

Overall view of new Voss "coil leveling line" for production of siding quality aluminum up to 48" wide. Modern equipment such as this means better quality aluminum from Sheet Aluminum Corporation.

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new products will be made of aluminum. . . .

"J" — Mississippi

MM — Actually, our estimate is conservative compared to replies to our November-December survey on estimated consumption of aluminum among product manufacturers (see details starting on page 70).

We've analyzed enough replies (over 350) to conclude that if the aluminum building product people push hard enough, they'll sell a million tons annually within three years. Lots of problems to be solved (such as silly pricing methods; bad production scheduling; and unkept delivery promises), but aluminum has made it in the building field. So much so that architects are getting ready to admit it.

Piston Trouble

Sirs:

Have been trying to get some information on D-132 aluminum alloy for a friend in Formosa. They are pouring pistons of D-132 and are having trouble with grain size. The grain becomes coarser and coarser and then gets beyond control. They need information on pouring practices, length of time metal can be held in the furnace and measures taken to refine grain size.

Information is desired on permanent molding machines suitable for use in making pistons, and their price.

"R" — Michigan

MM — We have referred your letter to the best manufacturer of permanent mold equipment we know of — Permanent Mold Die Company, Inc. of Hazel Park, Mich. — and not far from your plant.

However, your friend's problems are more fundamental than equipment troubles. Problems like grain coarsening have been licked a long time ago over here.

One can make a bad product out of good metal, but it's a damn sight harder to make a good product out of bad metal. So first off the Taiwan firm needs metallurgical help. For this they should see their aluminum supplier.

Aluminum Enterprise For Handicapped

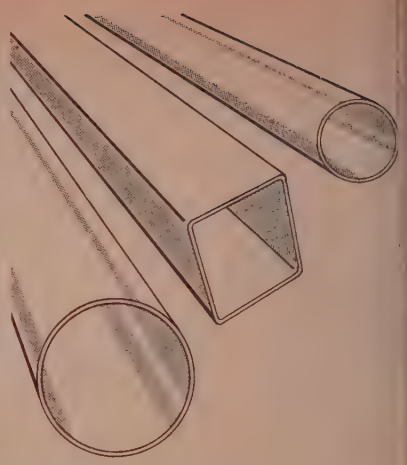
Sirs:

When we first started our little business, MODERN METALS was kind enough to run a story on us. That story had a profound effect. It started us "on the way."

We are now about to embark on a new adventure. Some time in February we will occupy a new building of approximately 28,000 sq. ft. in Miami, devoted to the manufacture of aluminum products, for which we have become modestly famous. In that operation we will use handicapped people, and have on our board of directors Henry Viscardi, Jr., president and chairman of the Board of Abilities, Inc. The fact that we are able to offer the handicapped a new look at life through the media of aluminum should cause many of the top executives who read MODERN METALS to ponder and examine their own operation to see if the same thinking could not be useful. . . .

"E"—New York

MM—This letter from North Shore Nameplate, Inc., Bayside, N. Y., reminds us of when the company first started making aluminum nameplates in a small way; grew to become a major factor in the business. Good luck in your second venture in Florida.



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HIGHLY FINISHED BORDER BETWEEN SINK UNIT AND WALL FOR LO-LINE CONTINUOUS COUNTER

Youngstown Kitchens' Jet-Tower Dishwasher is expertly engineered and manufactured with three G.E.I. shapes. The upper tub rails, lower tub rails and basket rails are from G.E.I. Before these shapes could be produced, all consideration had to be given to the fact that these extrusions would be subjected to extreme temperatures, detergents and wear and tear of rollers. G.E.I. came up with highly anodized, completely fabricated and durable shapes to help make Youngstown Kitchens' Jet-Tower Dishwasher a top quality product.

Youngstown Kitchens' new Woodcharm line employs a G.E.I. extrusion as the border between continuous counter and wall. Elegantly anodized, the G.E.I. shape blends in with decorative schemes and acts as buffer between sink unit and wall—resisting food splashes, detergents, etc. Drawers smoothly glide on an aluminum extrusion from G.E.I. Tappan range at far right also uses G.E.I. shapes for beauty and utility purposes.

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To Metalworkers

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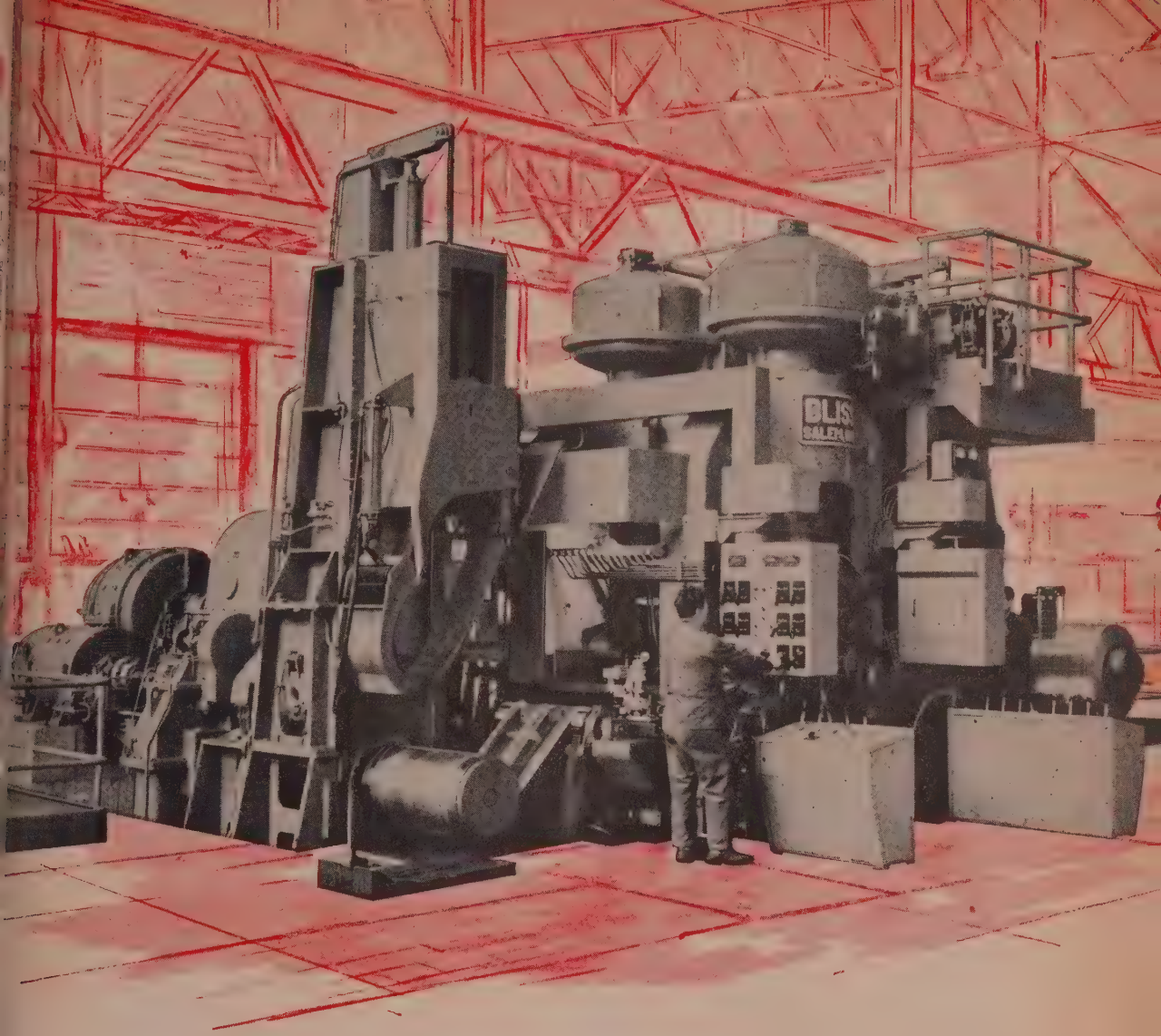
Here and There

Old Story, New Twist » » Around this time of the year we generally run into at least one story of aluminum in auto license plates. This year's version offers another example of how the light metal gets its foot in the door. The State of Iowa was counting on enough steel to make about 1.3 million pairs of plates, but were forced to go to aluminum when it couldn't have assurance of delivery of the heavier metal because of the steel strike. Production cost of the aluminum plates will run close to $298,000, compared with $269,000 for the run in steel. However, the cost of mailing about 400,000 pairs of aluminum plates will be $64,000 cheaper. Many another state has benefited by aluminum's light weight for plates, but it took a steel strike to put a bargain in Iowa's way. Wonder why.

For Smoother Castings » » An interesting demonstration was made by the Joseph Dixon Crucible Co., Jersey City, at the National Metals Exposition in Chicago last month. It employed a small induction furnace to melt aluminum, from which the molten product was poured into one of Dixon's permanent molds. Before solidification, the hot metal was sprayed with another Dixon product, a new colloidal graphite compound. After removal from the mold, spectators were invited to examine the casting and note how the graphite bath had given it a uniform, smooth surface finish, lessening the need for finish machining. Dixon also exhibited its line of lubricating products for metal, demonstrating them on samples of extrusion dies, mandrels, dummy blocks, die casting dies, conveyor belts and other items directly related to metal working.

To Save Money for Truckers » » GMC Truck & Coach Division of General Motors Corp. is pushing hard on sales of its new lightweight highway tractor which features an aluminum tilt-cab (weight only 696 pounds), and a new fabricated frame that is 300 pounds lighter than the previous designs. The manufacturer says that the carrier using this tractor can load an extra ton of cargo and still be within the 61,000-pound gross combination weight rating.

Dow's Second Competitor? » » Brooks & Perkins, Inc., Detroit, and The Magnesium Association were pleasantly jolted, recently, to learn that a Sarasota, Fla., high school student, Carol Lee Taylor, had produced a small quantity of magnesium by the ferrosilicon process. B&P and Calumet & Hecla operate Alabama Metallurgical Corp., Selma, Ala., for the production of magnesium by this process. The Magnesium Association had sent the young lady complete directions for her project. Silica and dolomite were close at hand, while the school chemistry lab provided the iron. Carol and her lab instructor built a small



New Bliss reversing cold mill for France's largest producer of brass strip

Near Paris, Compagnie Française des Métaux, France's largest producer of brass strip, rolls brass on its new Bliss 6½" & 30" x 36" four-high reversing cold mill.

The mill, which can attain a speed of 1,000 fpm is equipped with the auxiliaries necessary to produce brass strip of the highest quality, in widths up to 30" and thicknesses as fine as .0028".

The brass thus produced is used throughout French industry...for automobiles...for defense...for hard goods...for jewelry...for the myriad needs of free Europe.

The Paris installation of Compagnie Française des Métaux is the latest of many such Bliss mills being operated throughout the world, rolling all kinds of ferrous and non-ferrous material. To learn of other Bliss-engineered installations, write for a copy of our 84-page Rolling Mill Brochure, Catalog 40-B.

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Reply in confidence to Box 1212, Modern Metals, 435 N. Michigan Avenue, Chicago 11, Ill.

Lots of new business from light metals fabricators and manufacturers is obtained through ¼ page advertisements like this.

And the cost is sure low

only $110

per insertion (twelve time basis).

Write Dick Pulliam

MODERN METALS

Tribune Tower

Chicago 11, Ill.

arc furnace, using a coffee can lined with ½-inch thick charcoal and floored with carbon gleaned from "the inside of our heater while cleaning it." Other materials came from here and there, and finally, before a rapt student audience, Carol produced her magnesium. If the product was small in quantity, the thrill of achievement (and a grade of 94 for the project) were very real. "I think it's a very good idea, making magnesium from dolomite on a large scale basis," was Carol's verdict. "It's inexpensive and somewhat plentiful and dependable."

Introducing Hydro-T-Metal » » A bright future is anticipated for Hydro-T-Metal, a new alloy of titanium, copper and zinc, developed by Hydrometals, Inc., formerly known as Illinois Zinc Co. Fred M. Zeder, II, president of the Chicago firm, extolled the unique properties of the alloy which he expects will give brass, copper and zinc serious competition. He also believes it will give aluminum a run for its money in the future. In sheet form, Hydro-T-Metal averages about 35 cents a pound, considerably less than brass, copper or stainless steel. Zeder reckons on sales of some 32 million pounds next year. One of his 1960 sales targets is the building field where he expects to win Hydro-T-Metal applications that will displace about 7.5 million pounds of aluminum.

Junior Makes Good—Fast! » » Two months after introduction of Reynolds Wrap Jr., the household foil in colors, Reynolds Metals Co. reports sales 300% over anticipated volume. The seven-inch-wide aluminum foil wrap which is being made in red, blue and gold "has achieved national distribution quicker than any product [we] have ever added to the Reynolds Wrap line." According to Charles M. Mapes, Reynolds vp and foil wrap marketing chief, Reynolds Wrap Jr. "has met the toughest test of acceptance — reorders from supermarket chains and grocers supply firms — at a much quicker rate than market surveys had indicated. The brilliantly-hued foil is finding widespread use in home decorations, party foods, gift wrappings and as identifiable food wraps.

From Plane Frames to Mobile Homes » » Diversification is an essential move for aircraft companies who can look forward to lean years for the airframe business. So Chance Vought Aircraft Co., Inc., Dallas, Texas, has bought into the mobile homes industry in a big way. Under the aegis of Vought Industries, Inc., the company will operate eight plants of three mobile homes manufacturing companies which it has purchased or intends to purchase at a total cost of $60 million. Suddenly, Vought Industries is the biggest manufacturer in the industry. Firms acquired are General Coach Works, Inc., Marlette, Mich.; ABC Coach Co., Clarion, Pa., and Mid-States Corp., Battle Creek, Mich. According to C. E. Burt, Chance Vought vice president who has moved into the presidency of Vought Industries, a nationwide system of plants provided by these companies will overcome high transportation costs. The company will have a national marketing and distribution setup. Total sales of the acquired companies for 1959 might reach $60 million.

CHEMICAL PREPAINT TREATMENTS FOR METAL SURFACES

What they do, the types available, how they are applied

By J. H. GEYER, Manager, Product Development Dept., AMCHEM PRODUCTS, INC.

Paint systems have been steadily improved in an effort to produce more decorative, easier-to-apply, and more corrosion-resistant films. The ability, however, of any paint film to perform its predetermined functions cannot be fully utilized without properly preparing the metal surface.

Chemical *prepaint* treatments are designed to do four jobs and do them well. First, they remove organic soils, shop dirt, scale, and rust or corrosion products from the metal surface. Second, they provide surfaces that are completely compatible with subsequent paint films. Third, they produce a *tooth* that promotes good paint film adhesion. Fourth, they effectively prevent underpaint corrosion growth after any breakthrough in the paint film.

Basically, there are four types of chemical prepaint treatments—phosphoric acid, iron phosphate, zinc phosphate, and amorphous phosphate or chromate.

Phosphoric Acid—Phosphoric acid cleaner combination materials are an example of economical chemical prepaint treatments. Amchem Deoxidine is such a material. It removes organic soils, rust, scale and contaminating elements from the metal surface. It also produces a light etch on steel, aluminum or zinc surfaces which considerably aids in increasing paint adhesion. It does not, however, form an actual coating on the metal surface. Any breakthrough in the subsequent paint film will permit underfilm corrosion to proceed. Grades of Deoxidine are available for application by brush or swab, hot and cold dip, or hot spray.

Iron Phosphate—Iron phosphating processes are extensively used in the chemical prepaint treatment of appliances—water heater shells, ranges, washers, dryers and other *white lines*. These processes will produce excellent paint-bonding films on the metal and retard or prevent underpaint corrosion. Duridine, Amchem's iron phosphating process, is a combination organic soil cleaner and iron phosphate coating material. Both the cleaning and coating operations take place in the same bath. Duridine and other iron phosphates do not lend themselves to brush-on application, are primarily designed for spray type equipment of four or five stages. But several dip installations are successfully operating today by inclusion of an alkali precleaning stage.

Zinc Phosphate—Amchem Granodine is an example of zinc phosphating, the type now being used to treat steel in the automotive industry, and predominantly specified for steel ordnance and military items. This process forms a coating which offers the ultimate in paint adhesion promotion and vastly augments the corrosion resistance of subsequent paint films. Zinc phosphate materials are extremely flexible as to method of application—can be applied by brush, dip or automatic spray equipment. In a typical dip or power spray system, the stages would be alkali clean, water rinse, zinc phosphate treatment, water rinse, acidulated final rinse. If the metal has considerable areas of rust or scale, an acid pickle is advisable following the alkali cleaning stage.

On zinc surfaces, the zinc phosphates perform a rather unique function. They act as a barrier against chemical reaction between the applied paint film and the zinc surface. This effectively prevents blistering of the paint and early breakdown of the film. This is in addition, of course, to the improvement of paint adhesion and the retarding of underpaint corrosion. Amchem Lithoform is specially designed for use over zinc surfaces and finds wide application as a prepaint treatment for ornamental zinc die castings, refrigerator liners, and on most galvanized work requiring painted finishes.

Amorphous Phosphate and Chromate—These coatings are the films produced by the Amchem Alodine processes and similar ones on aluminum surfaces. They have met with wide acceptance in the prepaint treatment of venetian blind strips, refrigerator liners, aluminum heat transfer units, aircraft sheet metal assemblies, and many other items fabricated from aluminum. The various coatings provide an excellent film for the promotion of paint adhesion and effectively prevent underfilm corrosion. As in the case of zinc, aluminum exhibits a tendency to chemically react with some paint systems. The Alodine processes develop a barrier film between the paint and the aluminum surfaces which prevents this reaction. The Alodines are extremely versatile materials that can be applied to aluminum surfaces by brush, hand spray, dipping, or mechanical spraying. Brush application is particularly well adapted to the processing of parts too large for simple dip systems or in manufacturing operations that do not warrant a tank setup. In dip or spray application, the system usually consists of an alkaline preclean, a water rinse, the Alodine treatment, a water rinse, and an acidulated final rinse. Where the surface is heavily oxidized, a deoxidizer in the line is needed.

For more complete information about any one or all of these chemical conversion coatings, contact an Amchem sales representative or write us at Ambler 24, Pa.

AMCHEM PRODUCTS, INC. (Formerly American Chemical Paint Co.)
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A NEW 1250-TON EXTRUSION PRESS has been added to our original 2200-ton unit, placing us in a position to serve more users of aluminum extrusions. When you consider extrusions, consider Kawneer.

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Useful Data

Furnaces for heating and heat treating light metals are described in a booklet published by Surface Combustion Corp. Special sections cover heating for forming and forging, annealing, solution heat treating and precipitation hardening. Two charts indicate what type of performance can be expected from furnaces in various operations. Units are pictured along with diagrams showing instrumentation. For copy write H. W. Bluethe, Surface Combustion Corp., Toledo 1, Ohio.

Silver brazing preforms are detailed in a 16-page brochure, "The Path to Better Brazing." Opening section tells advantages in using preforms instead of hand feeding methods. Also discussed are instances where machine and mandrel wound rings are used to best advantage. The application of rings and washers is covered as are methods of ordering. Booklet also discusses use of fluxes and provides ring weight calculating chart and list of company's silver brazing alloys. For copy contact Harlan Olson, Lucas Milhaupt Engineering Co., 5040 S. Lake Drive, Cudahy, Wis.

Various cleaning methods that do not have damaging effects on aluminum and other light metals are covered in 4-page folder by the DuBois Co., Inc. Products such as Dura-Kote, Ion-Kote and Terj can be safely used in spray washers and Sprex A. C. for hot immersion tanks. Actusol is an emulsifiable and solvent cleaner for spray-on/hose-off cleaning of truck engines and other transportation cleaning uses. An aluminum-safe paint stripper, Strypp, is also detailed. For more information write Samuel J. Miller, Technical Vice President, The DuBois Co., 1120 W. Front St., Cincinnati 3, Ohio.

Aluminum alloys and the aluminum extrusion process are discussed in revised 12-page brochure released by Precision Extrusions Inc. In addition to descriptions of aluminum extrusion alloys, information is included on mechanical properties, recommended uses and reference numbers. Basic types of extrusions are illustrated and discussed, along with standard tolerance and pricing factors. Brochure can be had by writing Len Ziehm, Precision Extrusions Inc., 721 E. Green Ave., Bensenville, Ill.

Al-Fin molecular bonding is a process which has solved many difficult heat transfer problems by bonding ferrous components into aluminum castings. Process is detailed in brochure by Arthur Tickle Engineering Works. With method, aluminum alloys are metallurgically bonded to cast iron, carbon, alloy and stainless steels, nickel, Inconel, titanium, stellite, etc. The liquid gases, refrigerants and pneumatics industries use this process for obtaining low cost, smooth flow and leakproof components. Write N. P. Harvey, Arthur Tickle Engineering Works Inc., 21 Delevan St., Brooklyn 31, N. Y.

Formable sandwich core manufactured from continuous strips of aluminum foil and crimped into a sine-wave pattern is subject of 12-page bulletin. A second sine-wave is introduced by alternate foil ribbons, pro-

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in **Bridgeport** *Pre-Painted Aluminum Strip!*

Bridgeport Pre-Painted Aluminum Strip not only insures an almost unlimited choice of colors, but provides a selection of *five distinct types of finishes.* Each finish offers an outstanding advantage or combination of advantages, such as *unmatched formability, maximum exterior durability, eye-catching beauty* and *depth of color,* or *unusually attractive metallic appearance.*

Bridgeport Pre-Painted Aluminum Strip actually reduces overall costs by eliminating painting, as well as the need for equipping and maintaining a finishing department.

GENERAL PURPOSE ENAMELED ALUMINUM STRIP—Maximum exterior durability, 2-coat baked enamel. Hard, glossy surface withstands extreme exposure in all climates—coastal salt air, desert heat, high humidity, excessive moisture. Excellent formability without peeling, chipping or loss of adhesion. Available in an almost unlimited range of sun-fast colors.

ULTRA FORMABLE ENAMELED ALUMINUM STRIP—For extreme deformation. A 2-coat baked enamel which stretches during formation to the limit of the metal's elongation! Thermo-setting vinyl enamel is so hard it's virtually scratchfree . . . proof against marring during handling. Gloss or satin finishes, all colors.

WOOD GRAIN ALUMINUM STRIP—A finish composed of a wood-colored, baked ground coat, a printed wood grain pattern followed by a baked, clear finish. Primarily recommended for interior applications but also available in scratch-proof, thermo-setting finish for exterior service. Low gloss; fade resistant; excellent formability; abrasion, moisture and detergent resistant. Choice of several color and grain variations.

ULTRA EXTERIOR METALLIC FINISH ALUMINUM STRIP—Pastel tinted metallics. Soft colors blend harmoniously with surroundings. Extreme formability with all other desirable properties . . . sun-fast colors, good exterior durability in all climates.

ULTRA INTERIOR METALLIC FINISH ALUMINUM STRIP—A series of scintillating, realistic metallics in brass, bronze and copper shades. 2-coat finish consists of a primer containing ultra-fine metallic particles protected with clear top coat. Excellent moisture and detergent resistance. Excellent formability, good abrasion resistance. Bright or satin finish. For decorative interior applications.

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ducing an accordion-like construction that gives Multiwave its formability. Production processes are described and applications discussed. Write Narmco Resins and Coating Co., 600 Victoria St., Costa Mesa, Calif.

Aluminum catalog itemizes Bridgeport Aluminum products stocked by General Materials Co. Booklet includes federal specifications for commonly used aluminum alloys and decimal equivalents. Stock items covered are sheet, plate, round, hexagon, square and rectangular bar, and round tubing. U. S. Army and Navy drawings for extruded shapes are included. Contact Frederick Solomon, General Materials Co., 1400 Plaza Ave., New Hyde Park, N. Y.

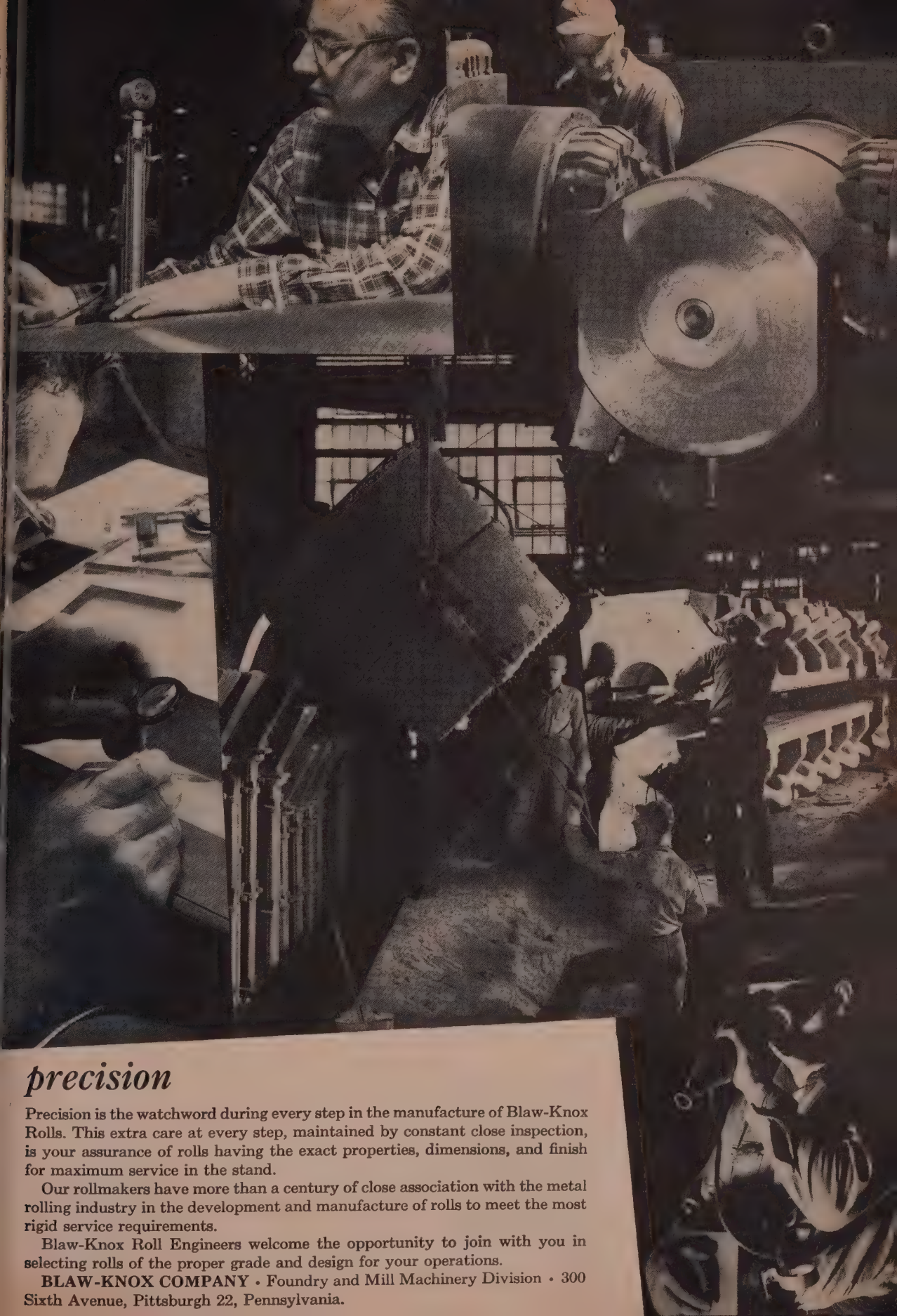
Aluminum in architecture — including availabilities, characteristics and suggested applications — is covered in new Kaiser booklet. Tables provide much of the information, with specific tables on structural stresses, finishes and selection of alloys for given applications. Standard and specialty sheet products are described and illustrated. For copy write Kaiser Aluminum and Chemical Sales Inc., 1924 Broadway, Oakland 12, Calif.

High frequency induction heating equipment produced by Magnethermic Corp. is presented in bulletin HF-58-6. All equipment is illustrated and diagrammed. Includes motor generators of 1,000, 3,000 and 10,000 cycles for forging, heat treating, brazing, annealing and shrink fitting. Also has standard line with heat station and generator control units. All specifications are given. For copy write John Logan, Magnethermic Corp., 3990 Simon Rd., Youngstown 7, Ohio.

Welding magnesium alloys is subject of Brooks and Perkins booklet. Pictures and diagrams help explain methods of joining this light metal. Characteristics of magnesium are detailed. Tables give recommended stress relief, typical strengths of arc welded magnesium alloys, spot welding practices and relaxation data of three types of sheet. Covers cleaning, gas, arc and resistance welding and brazing. Write Ralph Gillespie, Brooks and Perkins Inc., 1950 W. Fort St., Detroit 16, Mich.

Radiant infra-red industrial ovens and interlocking infra-red sections are covered in booklet by DriQuik Industrial Division, Dri Clime Lamp Corp., Greensburg, Ind. Advantages of ovens for drying and baking include no bulbs or sockets to burn out, no bright lights, resistance to vapors or moisture and rugged construction. Typical uses on 12 types of products are listed and various sizes and shapes of ovens are shown. Temperature control unit is described.

Hydraulic metal working machinery for nonferrous and ferrous metals industries are detailed in Loewy-Hydropress booklet 14.002. Machinery includes oil-hydraulic and water-hydraulic extrusion presses, push benches, testing machines and equipment and accessories for tube mills. All items are pictured and described in detail. One picture shows numerous extruded shapes presses are capable of producing. Contact W. Kauders, Loewy-Hydropress Division, Baldwin, Lima, Hamilton, 111 Fifth Ave., New York 3, N. Y.



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Precision is the watchword during every step in the manufacture of Blaw-Knox Rolls. This extra care at every step, maintained by constant close inspection, is your assurance of rolls having the exact properties, dimensions, and finish for maximum service in the stand.

Our rollmakers have more than a century of close association with the metal rolling industry in the development and manufacture of rolls to meet the most rigid service requirements.

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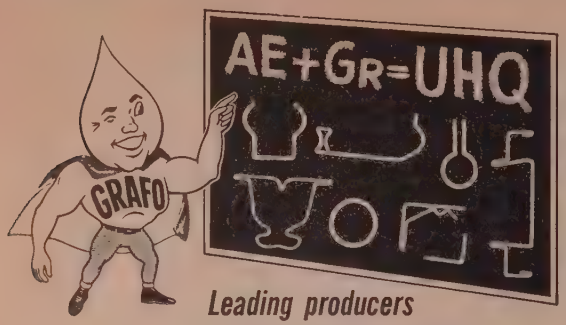

Leading producers of extrusions use GRAFO

Many manufacturers of aluminum extrusions already know the basic answer. It's simply this: *Aluminum Extruding* plus *GRAFO* equals *Uniformly High Quality!*

Why? Because GRAFO Colloidal Graphite dispersed in water reduces die wear, prevents sticking, gives better metal flow and improved production.

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New Enterprise

A new **extrusion** plant operated by Aluminium Meridional, a subsidiary of Aluminium Limited of Canada, has been built at Luce, near Chartres, France. Initial capacity of the plant is 3000 tons of extrusions annually. Aluminium Meridional is responsible for the Canadian company's international sales in France. The extrusions will be sold to help develop Limited's French building market. The plant is also expected to serve transportation and household equipment markets.

Increasing use of electronic data processing has heightened the importance of raised flooring. Floating Floors, Inc., 22 E. 42nd St., New York, makes a **raised floor system** which uses self-aligning, die cast aluminum floor plates and self-locking pedestal heads. Floor can take point loads of 1000 pounds per caster or uniform loads of 250 pounds per square foot, the manufacturer says.

Prehung **storm doors** that can be installed quickly, with a minimum of chance for error, are products of Warrenville Window Co., Mount and Manning Streets, Warrenville, Ill. The all-aluminum combination storm door is pre-drilled and pre-notched, eliminates any chance of drilling error. The door is weatherstripped, glazed and equipped with screen inserts, storm chain, latch and closer; it also has an embossed aluminum kick plate. The company also makes all-aluminum combination storm windows.

A lightweight garden hose **"caddy"** uses polished aluminum tube for its frame. Made by The Specialty Mfg. Co., 2356 University Ave., St. Paul, Minn., this hose reel is equipped with a faucet connector hose. The caddy rolls easily on balloon tired wheels.

Ball floats, designed for open or closed tank operation at low or high pressures and temperatures, are made in a variety of metals, including aluminum, by Arthur Harris & Co., 214 N. Aberdeen St., Chicago.

Harrington & King Perforating Co., Inc., 5637 Fillmore St., Chicago 44, works with William M. Schmidt Associates, design consultants in product development utilizing **perforated metals.** The company makes mock-ups of products to stimulate industrial designers' use of the material. H & K is a steady supplier of perforated aluminum grille blanks for American Motors.

High temperature pipe insulation made by Johns-Manville, called Metal-On, has an aluminum jacket. The insulation is J-M's Thermobestos, widely used in power generation and the process industries for temperatures to 1200° F. The aluminum jacketing is made of an alloy "selected for superior corrosion resistance," the company says. "Its thickness is ideal for outstanding appearance, stiffness, resistance to abuse and pitting."

Extruded aluminum **closet bar** takes sliding die cast aluminum hooks in its channel to hold clothes hangers. Idea of the gadget, made by Magnalum Products, Inc., 2460 N.W. 78th St., Miami, Fla., is to prevent hanger snarls. Company makes aluminum flanges which fasten

Alcoa puts the metal where you want it

This aluminum piston for an automotive air-conditioning compressor shows how far Alcoa goes to put the metal where you want it. Not just in primary screw machine operations, complex and demanding as they were, but on through a series of exacting secondary operations that enabled us to deliver a completely finished part.

Using 1 7/16-in. diameter 2014-T4 cold finished bar on a six-spindle automatic, we handled the forming, trepanning, drilling, facing and counterboring. Then we tackled the rest of the job—drilling and deburring two 1/16-in. cross holes. This was followed by coining the ball seat at a specified tonnage in order to insure proper assembly without distortion. Centerless grinding was then performed to a total tolerance of half a thousandth of an inch (plus or minus 0.00025 in.). All finished? Not by our standards. After final inspection, we cleaned every piece and packed it with meticulous care to prevent damage in transit, insuring safe and sound arrival.

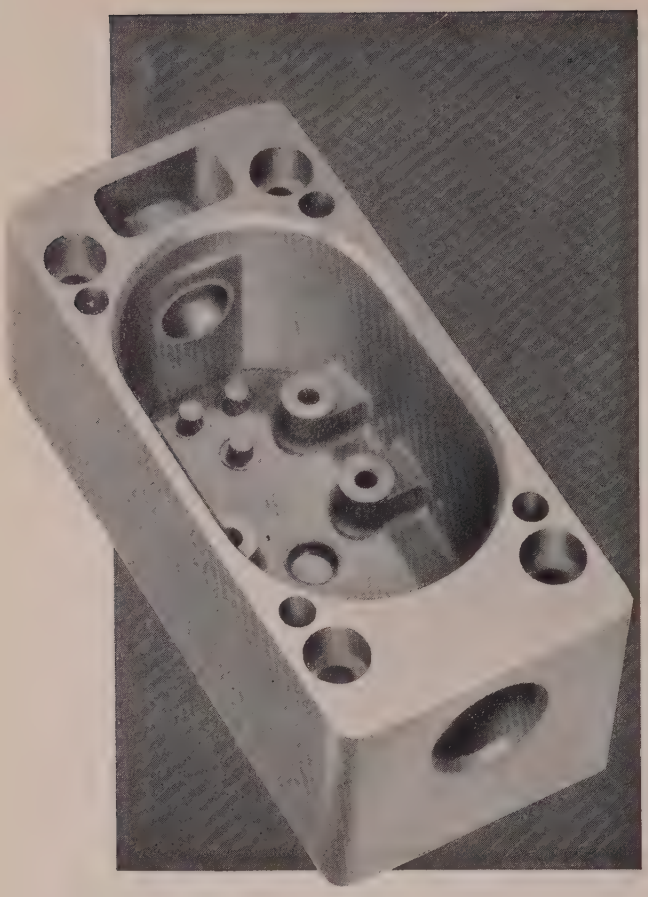
Whether it's screw machine parts, forgings, castings, extrusions or impacts, Alcoa can put the metal where you want it—precisely and economically. The payoff may be fewer rejects, new flexibility in design, less waste in production, a best-selling product—or all four. To draw on Alcoa's file of ideas and Alcoa facilities, write today: Aluminum Company of America, 920-K Alcoa Building, Pittsburgh 19, Pa.

Alcoa puts the metal where you want it—in castings, forgings, impacts, extrusions and screw machine parts.

ALCOA ALUMINUM

For exciting drama watch "Alcoa Presents" every Tuesday, ABC-TV, and the Emmy Award winning "Alcoa Theatre" alternate Mondays, NBC-TV

Your Guide to the Best in Aluminum Value



Low Labor Content is the Design Emphasis Today

In the Micro Switch Housing illustrated, the sintered bearings are cast in place, the holes are ready for tapping, the lugs and mounting pads are cast to size.

This is a prime example of maximum utilization of the die casting process.

The skilled and cost-conscious mechanics at Madison-Kipp worked closely with the switch designer to create a component of excellence and low secondary labor content.

Please clip this ad as a reminder to contact us when you have die casting requirements.

with MADISON-KIPP zinc and aluminum die castings

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MADISON-KIPP CORPORATION
217 WAUBESA STREET • MADISON 10, WIS., U.S.A.

Skilled in Die Casting Mechanics • Experienced in Lubricating Engineering • Originators of Really High Speed Air Tools

acing closet walls, for installation. Alternative is ninum brackets which fit over main bar unit and en to shelf above.

luminum Co. of America, Pittsburgh 19, is manuuring a new sun-screening and **decorative wall** em composed of three extrusions, a clip angle, a niature I-beam and a grille panelette. I-beams and angles are natural aluminum; panelettes are avail- e in baked enamel finish or with custom finishes. tem can be used to cover face of old buildings, or an overlay for cooling towers, elevator penthouses, ings, etc. Eleven standard patterns are available.

A camera mount for industrial closed circuit teleion systems is being produced by Kin Tel Division Cohu Electronics, Box 623, San Diego 12, Calif. uminum houses the basic pan-tilt head consisting of o fractional H.P. motors and drive systems. One otor drives tilt table and allows camera mobility 45 grees above and below horizon. Second motor conls panning and moves entire assembly from 0 to 5 degrees on a horizontal plane.

Extruded, anodized **aluminum sectional overhead rage doors** for residential and commercial use are ing produced by Allied Metals Inc., New London, onn. Corners of Berkeley Doors have cross-braced sset design with all members fastened with stainless eel screws. The lightweight, maintenance-free doors so have continuous interlocking weather seal and ashioned edge. Glass and aluminum panels can be ranged at customer's option.

Ski-Caddy, made by Ron-Vik Corp., 1330 Quincy . N.E., Minneapolis 13, is designed for carrying ater skis and tow-line in one compact kit. **The aluinum carrier** weighs 24 ounces, and will not corrode ven in salt-water areas. Spring-tensioned clamps are eavily padded to protect skis from marking.

Camp Craft Corp., P. O. Box 3237, Melvindale, Mich., has designed Topper, **a self-contained camping utfit** that can be set up by two people in 10 minutes. Basis of the unit is aluminum poles and frame. Also ncluded are an aluminum cupboard, a work counter, wo storage shelves and two beds. When set up Topper overs 107 square feet of space, and is more than 7 eet high at the center. It folds for easy car-top transportation.

Aluminum roof ventilator is driven by quiet, capacitor-type motor, wound for 115 volt, 60 cycle, single phase current. Air exhausting unit is made by Peerless Electric Co., 1401 W. Market St., Warren, Ohio. Bearings are permanently sealed and lubricated for life, and all operating parts are suspended on rubber mounts.

Small lightweight shapes, extruded from 3½-inch billets, are being produced by Mideast Aluminum Corp., U. S. 130, Dayton, N. J. The recently formed company has R. B. Sowers as president and R. J. Gilfillan as executive vice-president; is located between

(*Continued on page 28*)

221-225

JAMES COMMERCIAL | TALCOTT, Inc. FINANCING

YOU'RE HEADED IN THE "RIGHT" DIRECTION FOR SOUND BUSINESS GROWTH

WHEN YOU USE TALCOTT'S

Flexible Financing Plans

Expand your sales, discount your bills, buy equipment, expand your plant, have capital for other growth needs. Talcott can supply the revolving cash funds you need . . . through a flexible financing plan that fits your special requirements. Phone, write, or visit us for full details.

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- Factoring (Notification & Non-Notification)

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LEXINGTON CORPORATION Subsidiary 10 Milk Street, Boston 8, Mass Liberty 2-6264

DOW | METAL PRODUCTS

PRECISION MAGNESIUM EXTRUSIONS (inset) form two key parts for hydraulic paper cutter.

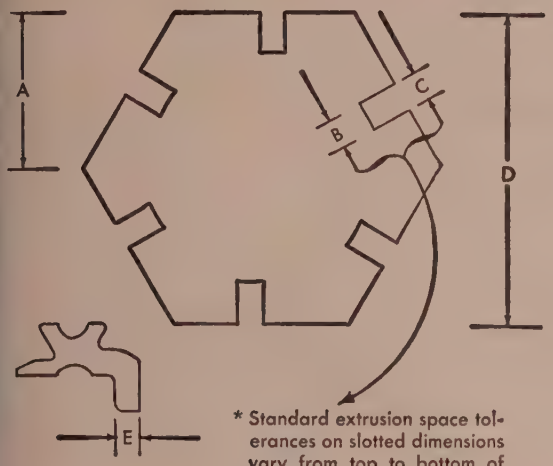
PRECISION EXTRUSIONS

tighten tolerances, cut costs

Paper cutter manufacturer slices production costs by replacing all-milled components with magnesium precision extrusions boasting tolerances as close as ± 0.0025.

Precision magnesium extrusions—a re
cent development of Dow's Madison
Illinois plant, deliver a big assist in th
design of parts that must be extremel
accurate and dimensionally stable. A
wide variety of precision parts can b
extruded with substantial savings i
scrap loss, machining and setup tim

Harris-Seybold Company, a division o
Harris Intertype Corporation, pu
these advantages to work in the ma
ufacture of hydraulic paper cuttin
machines. Results: six differen
machining and allied operations elim
inated . . . machining and setup tim
for two key parts reduced by 64% ar



* Standard extrusion space tolerances on slotted dimensions vary from top to bottom of the slot, depending on depth.

TOLERANCES HELD ON PRECISION MAGNESIUM EXTRUSIONS

Critical Dimension	Standard Extrusion Tolerance	Precision Extrusion Tolerance
A	± 0.012	± 0.0025
B*	± 0.007	+ 0.003 − 0.000
C*	± 0.012	+ 0.003 − 0.000
D	± 0.024	± 0.005
E	± 0.007	+ 0.000 − 0.003

78%. Basic material costs were also lowered. The metal previously used was supplied in a high-property alloy in order to minimize warpage during the extensive machining operations. The standard magnesium alloy now used costs less. In addition, straightening operations required with the previous metal are no longer necessary.

The two parts Harris-Seybold now buys as precision magnesium extrusions serve to position the paper correctly for a number of successive cuts. They range from 46 to 106 inches in length and must be both dimensionally accurate and free of kinks and bows. No machining of these extruded parts is required after they are received in the Harris-Seybold plant.

For facts and figures about precision magnesium extrusions as they apply to your requirements, write to THE DOW METAL PRODUCTS COMPANY, Midland, Michigan, Sales Department 1341CQ12.

GIANT EXTRUSION PRESS, largest used to extrude magnesium, produces sections up to 30-inch circumscribed circle. This 13,200 ton press extrudes large structural shapes of magnesium and aluminum for aircraft and missile parts, other applications.

ROLLING MILL at Madison, Illinois is the largest in the world for magnesium alloys. Flat sheet and plate and coiled sheet are produced in a wide range of sizes. Extra flat tooling plate for all tooling uses is also produced at this plant.

HOW MAGNESIUM PRECISION EXTRUSIONS CUT SETUP AND MACHINING TIME

PART AND MATERIAL	OPERATIONS REQUIRED	TOTAL SETUP & MACHINING TIME
Spacer Bar:		*10 pieces per production run*
Previous Metal	8	1,750 minutes
Magnesium Precision Extrusion	5	626 minutes
Stop Carrier Strip:		*60 pieces per production run*
Previous Metal	8	2,399 minutes
Magnesium Precision Extrusion	5	510 minutes

OPERATIONS ELIMINATED BY MAGNESIUM PRECISION EXTRUSIONS

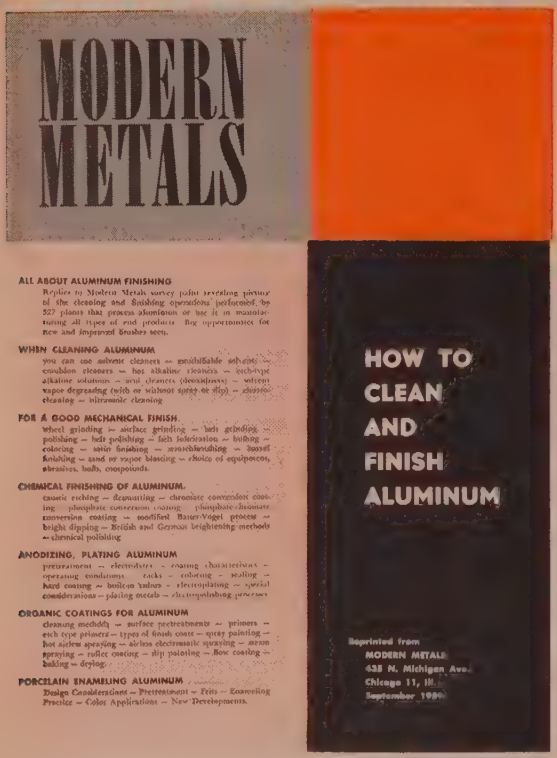
Spacer Bar	Stop Carrier Strip
1. Straightening	1. Straightening
2. Milling slots	2. Milling critical dimension
3. Burring slots	3. Straightening

THE DOW METAL PRODUCTS COMPANY, Midland, Michigan

A Division of The Dow Chemical Company

36 pages . . .

all about aluminum finishing



Single copies of this valuable reprint are now available at $1.00; from 6 to 25 copies, 75c each; for quantities over 25, 50c each. To order, simply fill in the form below and mail it, with payment, to . . .

MODERN METALS

1810 Tribune Tower **Chicago 11, Ill.**

Send me.....copies of the reprint, "How to Clean and Finish Aluminum." Payment is enclosed.

NAME

TITLE

COMPANY

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CITY ZONE STATE

12-59

New York and Philadelphia, and delivers to both area

Olin Mathieson Chemical Corp., formerly half-own of Almetco Inc., Nesquehoning, Pa., has acquired fu ownership of the firm. **Its extruded products** are us in the architectural, transportation, highway supp and other fields. Harry E. Gude, manufacturing vi president of Olin's Metals Division, will continue president of Almetco, and V. W. Archer will contin as plant manager.

Aluminum Inc., headquartered at 1520 S. Feder Highway, Fort Lauderdale, Fla., is a new firm head by Charles V. Cooper. Branch offices and warehous are located in Birmingham, Ala., and Charlotte, N. The company has been appointed United States distri utor in the southeast for the Alcan **foundry allo** manufactured by Aluminium Ltd. Sales Inc.

Polished aluminum frames adorn the modern li of lounge chairs manufactured by Ryder-Elliott In 2140 S. Davie Ave., Los Angeles 22. Styles include ar and armless, with solid fabrics or webbing, in colo suitable for indoor or outdoor use. Line includes vibrator model.

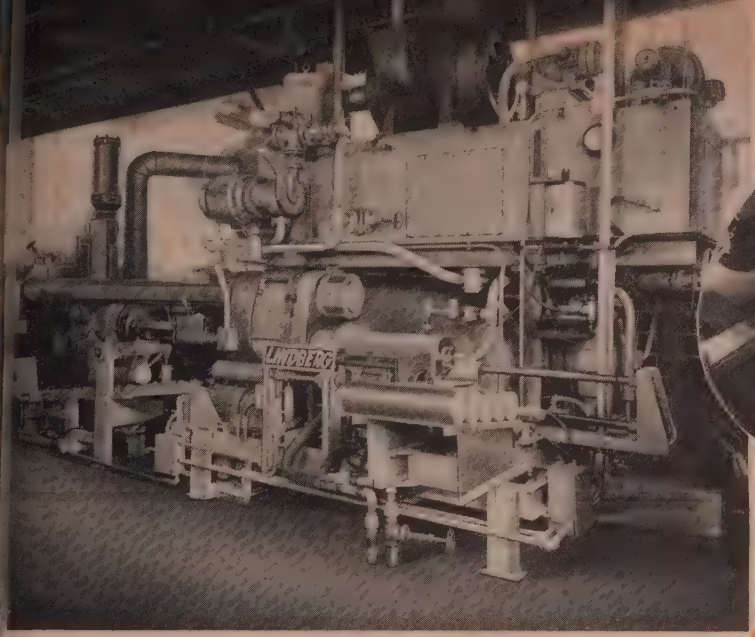
Interiors' Import Co., Inc., 783 Third Ave. at 49 St., New York, recommends a **fountain** to accent outdoor wall. Basin and ornaments are cast aluminu with antique gold leaf finish, contrasted with gra veined white marble panel.

Up to 18,570 cfm of air is moved by the **propell ventilator** manufactured by the Loren Cook Co., Ber Ohio. All-aluminum unit has deep-pitched blades, be drive, adjustable pulleys, integral wiring conduit, a one-piece top-cap and venturi-type curb base.

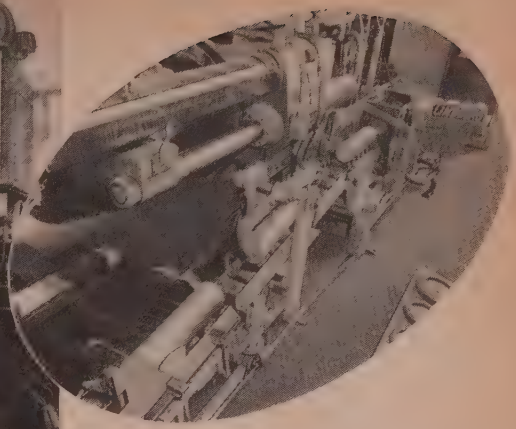
A new **aluminum closer** for sliding doors has be developed especially for screen doors, but is adaptab to wood and glass. Manufacturer is Kelly-Klozer C Reseda, Calif. Five-foot unit has an extension spri which automatically closes any door. The 1-inch dia eter aluminum tube attaches to exterior of buildi for screen applications, to the interior for glass doo

Extra-large **tackle and spin boxes,** manufactured Umco Corp., Spring Park, Minn., offer fisherm plenty of organized room for gear. Two models p vide 53 and 70 compartments for lures, plus lar storage area under seven cantilever trays. The case h a leather-grain embossed finish and a safety lock each end.

Aluminum Co. of America, Pittsburgh 19, is bui ing a **die casting plant** at Edison Township, N. J. T new plant is expected to be in operation by late 19 will occupy 200,000 square feet on a 76-acre tract. T new facility replaces the 37-year-old Garwood, N. works. Plans for the project started in 1957, but w delayed by the business dip. A good 1959 and a brig prediction for 1960 led to resumption of constructi at this time.



Lindberg 60 cycle billet heater installation on extrusion press at Hazelwood Engineering and Equipment Co., Hazelwood, Mo.



Operation of Lindberg billet heater is fully automatic. Billets are automatically delivered to the coil, heated, cooled to desired temperature and delivered to the extrusion press.

For improving extrusion techniques

Lindberg's new 60 Cycle Induction Billet Heater

This new Lindberg 60 Cycle Induction Billet Heater provides the means of improving the efficiency and economy of your extrusion techniques. Lindberg designers and engineers have pioneered many important developments in induction heating. This new billet heater is another example of leadership in this field.

Here are some of its advantageous features:

- Major components are separated for efficient utilization of space around extrusion press area.
- Special BTU metering unit for close control of billet temperature.
- Automatic initial billet temperature correction device.
- Fully automatic cycling of loading heating and discharge operations.
- Device for control of physical and extrusion properties of the billet.
- Maintenance is simplified because of accessibility to all component parts. Coil can be changed in less than 60 minutes. No thermocouple maintenance.
- Unit design for simple adjustment to accommodate various diameters and lengths of billets.
- Specially designed closed water cooling system for transformers and induction coil for most economical use of cooling water regardless of the location area of installation.
- Rugged construction of all major components.

Bring your extrusion problems to Lindberg. Our engineering staff will provide a complete consultation service on the installation and start up of equipment and extrusion techniques to help you meet most effectively the standard specifications of the industry. Get in touch with your local Lindberg Field Representative (see your classified phone book) or write us direct.

High Frequency Division
LINDBERG ENGINEERING COMPANY
2446 West Hubbard Street, Chicago 12, Illinois
Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California
In Canada: Birlefco-Lindberg, Ltd. Toronto

- **For ferrous or non-ferrous metals**
- **Available in all sizes and capacities**
- **Fully automatic operation**

LINDBERG heat for industry

ALCOA REWARDS GOOD DESIGN IN ALUMINUM

New annual awards program cites outstanding designs; promotes winners' accomplishments in 4-color advertisements in big industrial magazines.

THIS IS the heyday of the design consultant and the industrial design department. Industry spends hundreds of millions of dollars each year for fresh designs that will keep established products competitive, and assure success for new products.

Often enough, products either sell or flop on the strength of designs researched and developed by independent consultants. These designers call the turn in the selection of raw materials that go into more and more consumer products. No wonder, then, that the aluminum industry has for many years sought the designer's favor.

In recent months, Alcoa has courted the designer more ardently than ever. Last month it chose the annual meeting of the American Society of Industrial Designers as the setting for the first of its awards for "outstanding creativity in designing with aluminum."

First award winners were Peter Muller-Munk, head of Muller-Munk Associates, Pittsburgh; Charles Eames, Venice, Calif.; and F. W. Priess, manager of product and packaging design, Montgomery Ward, Chicago.

Samuel L. Fahnestock, Alcoa's chief industrial designer, made the presentations. Alcoa wants to help the industrial design profession by explaining the designer's mission to American business, Fahnestock declared.

Direct accomplishment of this aim is by a series of Alcoa four-page, four-color advertisements in the magazines, *Fortune* and *Industrial Design,* in which each designer and his award-winning project will be featured.

Muller-Munk won his award for redesign of the world-famous Graphlex press camera. As described in the ad, the challenge was one of increasing the camera's appeal to amateur photographers (a huge untapped market) by giving it a more simple appearance and greater flexibility in composition.

The ad tells how the design firm "drew heavily on Graphlex research, checked 'human engineering' all the way from typical handholds to the mechanics of shutter tripping."

In the camera's frame, laboriously dovetailed wooden joints (high production costs) gave way to an extruded aluminum strip, bent to shape and butt welded. The beaded edges of the extrusion add rigidity to the part and serve as trim strips for the covering.

All told, the new Super Graphic contains 17 aluminum components which are pictured on the last page of the ad insert.

In a brief account of aluminum's role as a sales builder and cost cutter Alcoa points out how anodizing replaced paint where a light-absorbing black finish was needed (it also ends chipping and scratching); how die casting imparted high strength and dimensional accuracy in intricate parts; how stamping with low-cost dies reduced costs without sacrificing finish; and how aluminum screw machine stock yields three times as many parts per pound as alternate metals.

"Aluminum extrusions, typified by the Super Graphic frame and yoke, permit the design of complex cross sections that would be prohibitively expensive — or impossible — to produce by any other method," Alcoa declares.

Doubtless the same hard hitting format will be followed in subsequent ads which will feature the award-winning efforts of Eames, a consultant who produced a cast chair design for Herman Miller, and Priess, whose design department at Montgomery Ward "makes significant use of aluminum."

The Alcoa ads are the awards, giving consultants a generous measure of publicity which they, as professional men would doubtless refrain from buying. Free form aluminum desk pieces, emblematic of their achievement, were given to the winners on the occasion of the formal awards presentation.

■ *First Alcoa design award winners' projects exploit versatility of aluminum. At left, designer Peter Muller-Munk poses with the new Super-Graphic (foreground), latest model of world-famous press cameras. Extrusions, die castings and black anodized aluminum are some of the forms used. Charles Eames (center) is shown with his prize winning cast aluminum chair. At right is F. W. Priess, Montgomery Ward design chief, whose product packaging designers use aluminum extensively.*

A DEVELOPMENT OF DIVERSEY RESEARCH

Diversey's new electrocleaning development can boost your output ... and reduce costs

This could be the electrocleaning improvement you've been waiting for. The combination of Diversey No. 15 SOAK CLEANER plus new Diversey No. 35 ELECTROCLEANER means increased production . . . and lower cost per part. You get absolute cleanliness with smut-free, waterbreak-free surfaces. The treatment results in more adherent plate . . . sharply reduced rejects . . . lower costs.

Here's the combination that is getting a new high in results on high-speed production lines:

Diversey No. 15 heavy duty soak cleaner. High speed removal of oily contamination • thorough emulsification • exceptional wetting action.

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Maintenance savings, too. Both cleaners deliver a new high in contamination tolerance for long solution life. And their advanced type water softening properties prevent hard precipitates from forming on tanks, reducing maintenance and down-time.

Get the facts now on the new cleaning combination that can give you better plating at less cost. See your Diversey D-Man or write Metal Industries Department, The Diversey Corporation, 1820 Roscoe Street, Chicago 13, Illinois.

DIVERSEY®

Why CALUMET & HECLA Entered the Magnesium Business

100-year-old copper producer surveyed present and potential users of magnesium; found sentiment favoring second commercial primary producer. Other reasons cited in Magnesium Association meeting speech

By H. Y. Bassett, President, Calumet & Hecla, Inc., Chicago

THIS is the first time a representative of our company has appeared before the Magnesium Association. Calumet & Hecla is the major owner of Alabama Metallurgical Corp. (Alamet), which, less than two months ago, produced its first pound of magnesium at Selma, Ala.

We are raw freshmen in the industry, but I am pleased to have been invited to address this meeting. I did not have to ponder long before coming up with an appropriate subject. Certainly, I was not invited to describe some advance in the art. It seemed obvious to me that the question in your minds, and the one deserving a frank answer, is: "Why did Calumet & Hecla get into the business of producing primary magnesium?"

There was no casual flirtation that suddenly resulted in our marriage with Brooks & Perkins in this venture. We had looked long and hard in this direction. Extensive investigation and evaluation had convinced us that it was logical and desirable for us to become producers of primary magnesium — if done under the proper circumstances.

Two Big Questions

We had followed up careful studies of every pertinent economic study with basic, original research of our own. We had bolstered that with interviews, some of them in depth, of many present users of magnesium. We talked with many others who logically should be major users of magnesium. There were at least two things we had to be sure about.

First, did present users agree with economists who claim magnesium has a bright growth future, and did their reasoning stand up under critical analysis? Second, was this the right time for a second commercial producer to enter the field? We sought many other less important answers, and we got a few that we hadn't anticipated.

We talked with dozens of major users. About nine out of ten were highly optimistic about the future growth of the magnesium market. They said that with a stepped-up promotion of the metal and its alloys, the consumption of magnesium could be increased substantially.

Technological Gains

On the technological and research fronts we were further encouraged by such advances as these:

1. New and improved alloys developed for use in jet engines and missiles, with excellent physical properties at elevated temperatures.

2. Improved alloying techniques and fabrication processes, and new equipment installed for producing larger structural shapes.

3. New techniques developed in welding, bonding, and forming, and improved methods for extruding and forging magnesium alloys resulting in the production of finished products with better mechanical properties.

4. Improvements in foundry practices and heat treatment of castings, resulting in increased tensile and compression strength.

5. New and improved protective coatings, which give better protection against corrosion.

6. Improved methods of producing die castings, leading to greater versatility and economy.

H. Y. Bassett

"We've built a plant, and it appears to operate efficiently. We believe we have a capable management team . . . Work is proceeding on schedule, and we are hopeful that the target date of January 1, 1960 for full production will be met."

There was general agreement that the acceleration of military programs, the increasing production of missiles, and the growing use in civilian applications will bring a resumption of the long term upward trend in the industry. We heartily concur.

In seeking answers to the question —what is magnesium's future growth potential?—we found them linked almost inseparably to the second major question. Most respondents qualified their projections for the future by saying that they could be fully realized only if there was a good second primary producer, that the growth would happen more quickly and to a greater magnitude if that were the case.

These users felt that industry growth would be spurred by a second major company able and willing to share with Dow the expenses and problems of research and promotion of magnesium. Dow has had to shoulder this huge chore virtually alone for several decades.

It is obvious that many potential big volume users have shied away from using magnesium while there was only one producer in the field. They require an alternate source of supply. I can start with automotive, and you could quickly add more to the list.

This situation is particularly true with respect to virtually all structural uses, which are expected eventually to account for the lion's share of consumption. Many who should be major customers have been reluctant to go through the necessary retooling or redesigning to use magnesium when there was only one source of supply. As a fabricator, I can't blame them.

Historically, this situation has always limited industry growth. Competition we believe, will foster expanded use that can't help but be beneficial to all concerned. The aluminum industry and its tremendous growth since World War II is an excellent example of what can

PYRO

provides both!

"HARD COATING" GIVES ALUMINUM HARDER-THAN-STEEL PROTECTION

The Alumilite and Martin Hard Coat processes extend the use of aluminum into areas once exclusively steel's by producing a file-hard highly dielectric anodic coating up to .005" thick. It offers unusually high corrosion resistance and exceptionally long wearing surfaces; can be applied selectively; provides an excellent pre-surface treatment for Electrofilm solid film lubricants.

Fields of application include aviation and avionics; gears, worms, splines, etc.; building and construction; heavy industry; transportation; and electronics. PYRO's newly completed and greatly expanded facilities mean less handling, more efficient production, batch-for-batch uniformity, and faster delivery.

Whether your product demands rugged Hard Coating or beautifying color anodizing . . . whatever your finishing needs . . . CALL PYRO!

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happen when additional suppliers enter an industry.

It is our policy never to enter into corporate relationships, such as ours with Brooks & Perkins in the ownership of Alamet, where we can't make a substantial contribution, other than financial, to the success of the venture. We don't "go along for the ride."

You probably know a great deal about Brooks & Perkins, its operations, its products and its people. You accept them as old-timers in this relatively young industry, and as the largest independent fabricator of magnesium.

"Calumet & Hecla Is . . . "

But you probably don't know nearly as much about us. I hope we can correct that soon, and that you will learn to respect our way of doing business. Calumet & Hecla is a relatively large company, headquartered in Chicago, with major metal fabricating plants in Detroit, and Decatur, Ala.; copper mines in Upper Michigan; uranium mines in New Mexico; and lumbering operations in northern Wisconsin and Upper Michigan.

We have two subsidiaries located in London, Ontario, Canada: Calumet & Hecla of Canada Ltd., producing copper and copper alloy tubing, and Canada Vulcanizer and Equipment Co., Ltd., manufacturer of vulcanizing and retreading equipment and heat transfer equipment.

Our total sales for this year should be in the neighborhood of $70 million, and we employ approximately 4000.

As far as Alamet is concerned, we came into the picture with about 100 years' experience as a copper producer as one of our principal credentials. We certainly should know something about geology, mining and refining, all of which have some bearing on Alamet.

Our experience in economically operating large-scale, low-cost metal recovery plants should also be helpful. Calumet & Hecla's Wolverine Tube Division has had a long, successful career in metalworking, so we can understand the requirements of those who fabricate magnesium.

Of perhaps equal importance over the long pull, we had a reservoir of trained, experienced managerial talent to contribute to the new enterprise. This talent came into being largely by necessity.

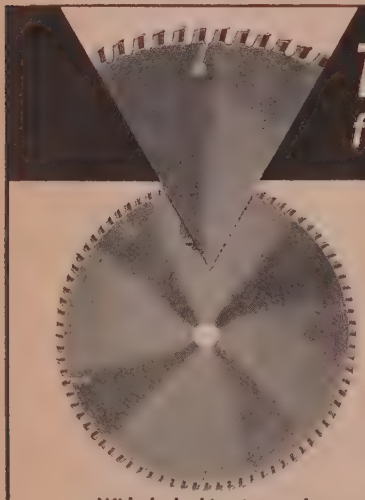
During the postwar years Calumet & Hecla diversified its activities, and expanded and modernized both new and old facilities. To a greater degree than most firms, we tried to develop from within our own ranks the managers needed to run this growing business. We carefully assessed the potential of every individual on the payroll, then helped him develop it in every conceivable way, both on the job and through the best available outside training courses.

This managerial development program was worth every nickel and every minute we put into it. It gave us the leaders and managers that money often can't buy, and prepared us for future opportunities to put men into responsible positions, with perfect confidence in their capabilities.

It is too early for us to say optimistic things about the Alamet operation. Approximately two months of limited production hardly constitutes solid operational experience. But we have crossed the first hurdles without knocking any of them over.

We've built a plant, and it appears to operate efficiently. We believe we have a capable management team at Selma; work is proceeding on schedule and we are still hopeful that the target date of January 1, 1960 for full production will be met.

This is the "wait and see" period. We're working, watching and waiting. Six or eight months from now Alamet expects to have something more specific and detailed to say.



THE SECRET'S IN THE DOT
for all non-ferrous metal cutting...

HEINEMANN'S GOLD DOT
CARBIDE-TIPPED SAW BLADE

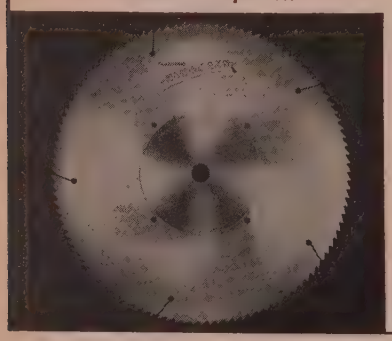
The insertion of copper discs at the base of each expansion slot under high pressure on the Gold Dot Saw has solved many problems which have plagued the users of carbide saws.

These discs give you a saw that is noiseless, vibrationless, smoother cutting, highly resistant to crackage.

Custom made from the highest quality steel and carbide available. Perfectly balanced, sharpened and tensioned.

Available in sizes from 4" to 36" diameter, any tooth spacing and thickness.

With locked-in tips and vibration dampeners.



HERE'S ANOTHER QUALITY BLADE WITH VACUUM LUBRICATION HOLES for cutting all non-ferrous metals

Vacuum holes distribute lubrication evenly—teeth properly formed for fast chip removal and free cutting—ground to exact tolerances—double tempered—just a few of the many reasons Heinemann Metal Saws are so widely accepted for the cutting of aluminum, copper and all other non-ferrous metals.

Available in diameters from 5" to 24". In thicknesses from 1/16" to 3/8". Either straight sharpened, bevel sharpened, or triple chip sharpened.

Write today for full details on our complete line of quality saws

HEINEMANN SAW CORPORATION • Canton 6, Ohio

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ALUMINEWS

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MIRRO ROLLS ITS OWN

New $12 million rolling mill to serve the big and growin needs of a major user of aluminum sheet. Ambitious pla calls for doubled sales in ten years. New products wi include boats, buildings, roofing, foil, containers, et

WITH an ambitious sales goal of $100 million annually by 1969, Mirro Aluminum Co. has mapped a comprehensive long-term strategy that will move the company into new fields of endeavor, broaden its present market base, augment its product mix, and greatly boost its use of aluminum.

Long famed for its line of Mirro aluminum household utensils, the big Wisconsin-based company has already reached into other product fields such as sporting goods, toys, building products and giftware. On the drawing boards are plans for further diversification in these and other fields.

Since all of Mirro's products are made almost entirely of aluminum sheet, substantial expansion of the company's sheet rolling capacity was essential. When the plan was being formulated several years ago, it became evident to Mirro management that their out-moded reroll operation would be far from adequate.

Since mere expansion of this facility could not provide the needed capacity or efficiency, Mirro decided to build an entirely new and integrated rolling mill. A 104-acre site was acquired just outside Manitowoc, long-term financing was arranged, and construction of the mill was begun in 1958.

Early this month, Mirro proudly showed its newest facility to the press and public. Covering an area nearly equal to three city blocks, the new $12 million rolling mill is the only fully integrated plant of its type in Wisconsin. When in full operation, it will have an initial capacity of 30,000 tons of aluminum sheet and foil annually.

Basic mill design provides for considerable expansion in the future, however. Its 238,818 square feet of floor space boosts Mirro's total manufacturing area to nearly 2 million square feet.

For Mirro Products Only

Other producers of aluminum sheet need not fear this development; Mirro has no intention of selling raw sheet to outside users. The mill's entire output is slated for the company's large and growing line of aluminum products.

Coiled sheet will be rolled in gauges from .010 to .125 inch; flat sheet from .010 to .250 inch. Maximum width will be 48 inches, and coiled stock will be slit to narrower widths as needed. All output will be confined to the non-heat treatable alloys.

Mirro's new mill is completely integrated; all operations, from melting ar casting of billets to coiling, slitting ar leveling of finished sheet, are performe under one roof. Foil rolling, a new ve ture for Mirro, will also be performe in the main mill building.

Production operations begin in t melt room, dominated by two 45,00 pound capacity Rockwell furnace which are charged with pig and scra by lift trucks. Although the capacity each furnace is 45,000 pounds, on 20-24,000 pounds of metal is charged any one time.

A semi-continuous melting method used; there is always approximately on half a furnace load of molten met when the pig, scrap, etc., are added. furnace is completely drained only the end of the week or when the all is changed.

To guard against fuel failure, t furnaces are designed to burn eith gas or oil. Normally, gas is used. Fu nace temperature is approximately 170 F, while the molten metal itself is ke at about 1360°.

After fluxing to remove oxides ar other impurities, dross is skimmed fro the top of the melt into buggies ar transported to the dross recovery roo

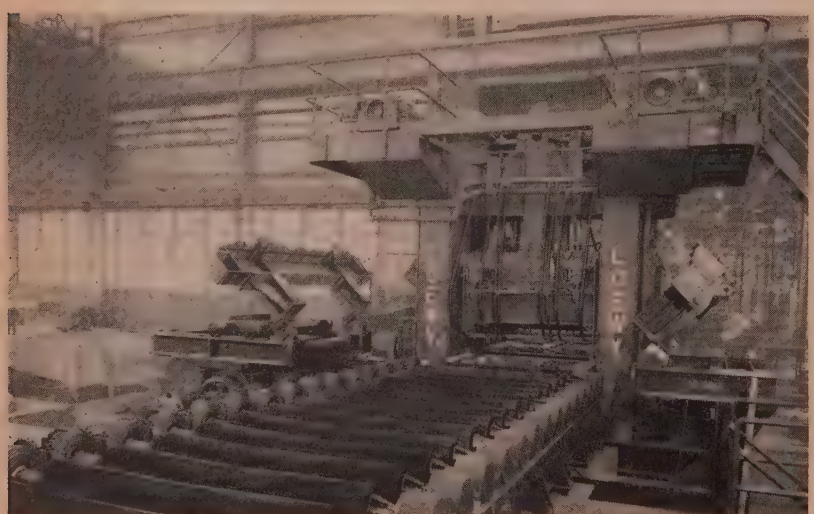
From Melting To . . .

At intervals, depending on castir cycle, 20-24,000 pounds of metal tapped off and conveyed through tran fer troughs to the holding furnace. Th melting furnace is then recharged wi more pig and scrap for the next hea

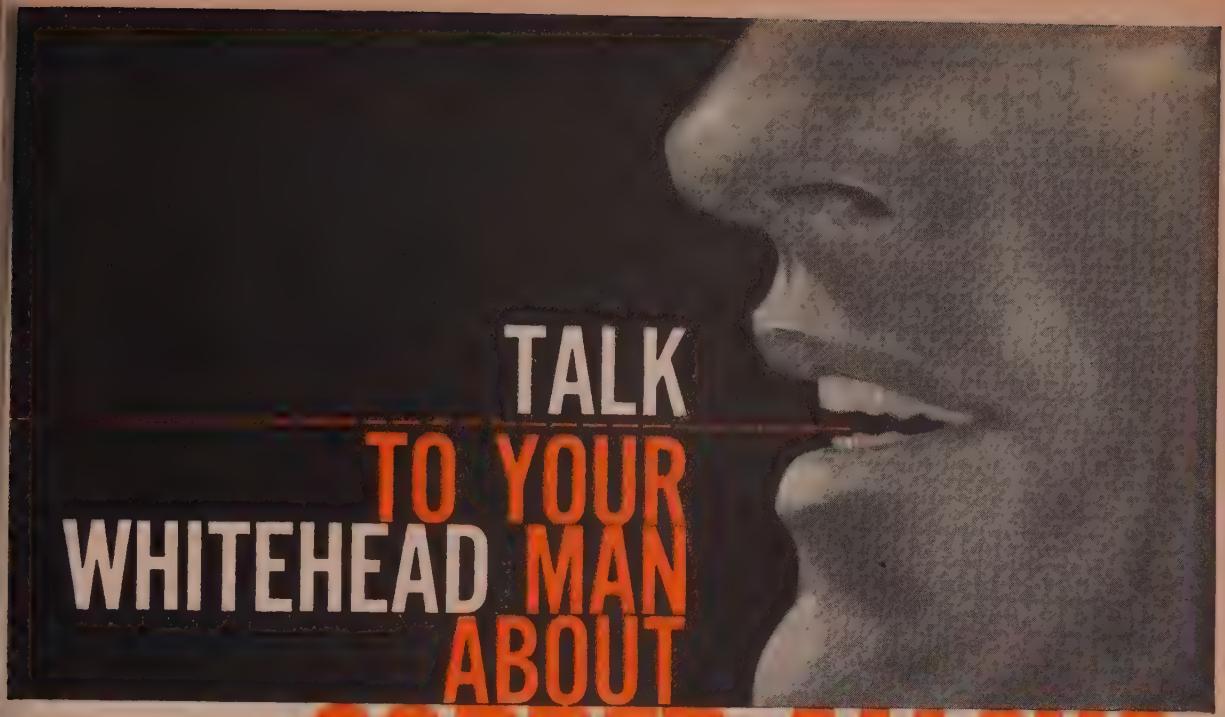
In the Rockwell holding furnace, th metal is held at proper casting temper ture and is cleaned by a second fluxir process. Between 20-24,000 pounds metal is required for each cast, leavir a reserve of 6-10,000 pounds in the fu nace at all times. This furnace also h dual burners for gas or oil.

The Loma casting machine casts fou ingots at a time by the direct chi process. Each ingot measures 12 fe long, 10 inches thick and either 36 42 inches wide. The larger ingot weig 6000 pounds. Thus four ingots weig 12 tons. Casting time is one hour.

Ingots are removed from the castir station by a large overhead crane, ar



■ *Mirro Aluminum's hot mill takes 10-inch ingot and rolls it to 3/16-inch reroll stock. The mill can hot roll up to 120 ingots in an eight-hour shift.*



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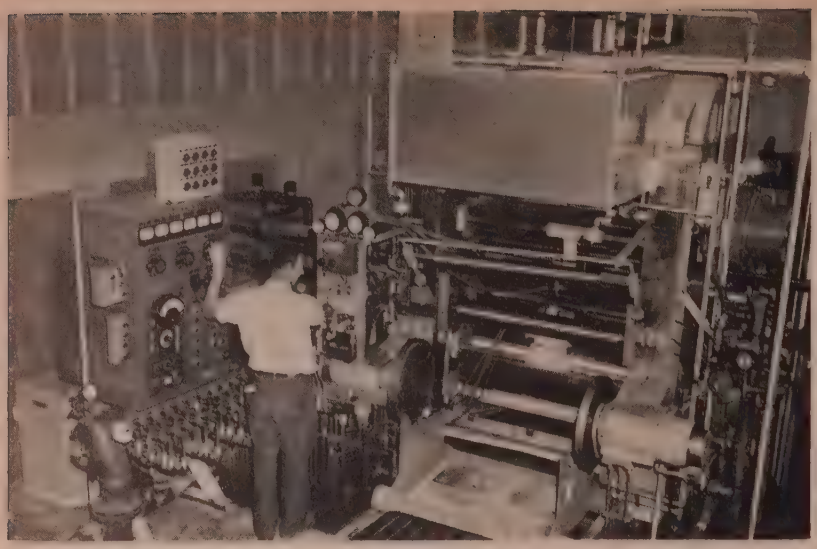


■ *A limited portion of Mirro's cold rolled sheet will be turned into foil on this Hydromil which is equipped with hydraulic rather than electric screw-down.*

either stored at the south end of the building or loaded into one of the two homogenizing furnaces capable of holding 270,000 pounds (135 tons) of ingot.

For Uniform Structure . . .

In homogenizing, the metal is heated to 1050° F and held at this temperature for 48 hours to develop uniform structure and dispersion of alloying elements. Ingots are then withdrawn from the furnace, put into the cooling area, then transferred to the unloading area. The homogenizing furnaces, built by Surface Combustion Corp., are fired by gas.

A Loma slab saw then cuts the ingots to lengths required by the hot mill. These may be four, five or six feet long. The ingot is placed on the roller table by the conveyor, then run into the saw by motor driven rollers. The 62-inch diameter saw can cut an ingot 16 inches thick and 48 inches wide.

After sawing, the sections are moved down the exit conveyor to the ingot scalper, which shaves metal from both sides of the slab. The machine is designed to scalp ten ingots per hour and can cut to a depth of about a quarter inch without lubrication.

Chips and fine scrap from the slab saw and the scalper are conveyed through air ducts to an Ajax-Magnethermic electric induction furnace where they are melted down and either cast into ingots or carried in molten form to the melting furnace. Considering recovery of metal from dross and mill scrap, Mirro ends up with a loss of only one half of 1%, based on the original weight of metal melted.

Scalped ingots are heated to rolling temperature — 900-925° F — in two reheat furnaces built by Surface Combustion Corp. At the unloading end of these furnaces an operator removes heated ingots and delivers them to th hot mill table by automatic controls.

The hot breakdown mill is a revers ing 2-high unit built by Loewy-Hydr press Division of Baldwin-Lima-Hamil ton Corp. The rolls are 32 inches i diameter and 72 inches long. Power i supplied by a 2500-hp motor. Severa passes through this mill reduce th thickness of a slab from the original 1 inches to a final 3/16 inch.

The table on the entry side of th hot mill is about 250 feet long while th exit table is about 320 feet long. At th end of the exit table is the shearing trimming and coiling equipment.

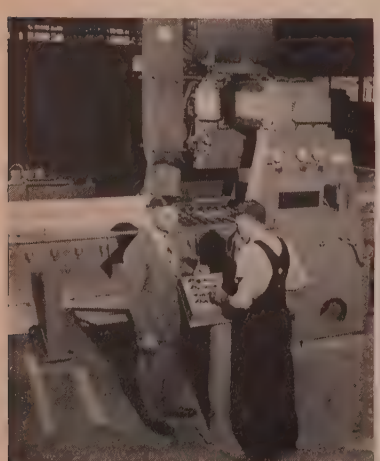
Estimated production time on the ho mill is four minutes per ingot. Thus, th mill can hot roll up to 120 ingots in a 8-hour shift.

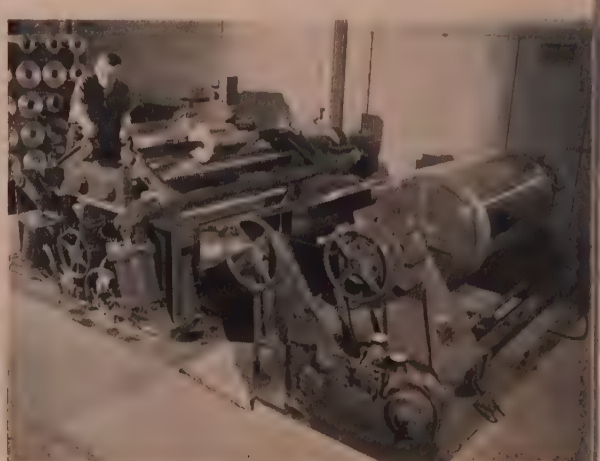
Hot rolled 3/16-inch thick stock reduced to lighter gauges on the 4-hig cold mill, also supplied by Loewy-Hy dropress. Work rolls on this machine ar 15 inches in diameter and 60 inche wide, while the backup rolls are 4 inches in diameter and 60 inches wide With proper control of roll opening mill speed and metal tension, this mi can accomplish a 50% reduction in shee thickness per pass. A 1500-hp moto drives the mill.

Fast Slitting, Too

Cold rolled stock may then go to th slitting department where one of th two Stamco slitters will slit it to na rower, more convenient width for sul sequent fabrication. One slitter wi handle metal from .010 to .051 inc thick; the other will slit .051 to ⅛-inc stock. Both operate at 500 fpm.

After rolling operations, the metal too hard and brittle for forming int articles requiring deep drawing. An nealing to the soft temper is done i four Rockwell furnaces. Coils are ru into the furnaces where they ar





■ *Mirro's huge slab saw (left) has a 62-inch diameter blade, can cut ingot up to 16 inches thick by 48 inches wide. Large homogenizing furnaces like this one (center) produce structural uniformity and complete dispersion of alloying elements. Righ foil is run through this slitter where it is trimmed and slit required widths.*

ated to between 550° and 800°, depending upon alloy and temper required.

A small portion of Mirro's output of cold rolled sheet will be subsequently reduced to foil gauge on the company's new high speed Loewy Hydromil. To protect the mill and its product against contamination, the installation is housed in a separate enclosure which is pressurized and supplied with filtered air. There is room for two more foil mills in this enclosure, and provision for still more units elsewhere in the plant.

The foil mill operates at up to 2200 feet per minute on the last pass in rolling the foil down to .0007-inch thick. Speed on the first pass is about 800 fpm, on intermediate passes up to 1500 fpm.

The Hydromil is a 4-high unit with work rolls 9½ inches in diameter and 48 inches wide and backup rolls 22 inches in diameter and 48 inches wide. The main motor is a 600-hp unit. The unwind reels and rewind reels have drives and drag generators of 125-hp and 25-hp capacity each.

A Stamco slitter and an annealing furnace built by Surface Combustion Corp. round out Mirro's new aluminum foil installation.

The major portion of the company's foil sales will be through food brokers with national distribution. Mirro sales organization will service the company's established retail outlets, which include hardware, variety and department stores. It is expected that around 80% of household foil sales will go through supermarkets and food stores, however.

The cold mill, shown here during installation, reduces the 3/16-inch hot rolled stock to manufacturing thicknesses. Heavy back-up rolls enable mill to make a 50% reduction in one pass. Mill housings are designed for separating force between the rolls of 3,000,000 pounds.

In addition to household foil, the company plans to produce disposable foil dishes, containers for bakeries and food packers, food wraps and laminates.

The new foil operation is just one aspect of Mirro's program of product diversification. Although cooking utensils, electric housewares, toys and giftware will continue to dominate the company's marketing program, new products are well underway to exploit the new mill's capacity.

Mirro-Craft welded aluminum boats are among the larger unit products already in production. Three new models introduced for 1960 include the Camp 'n' Cruise, the Ski 'n' Troll, and the Family Runabout. Each is 16 feet long with a 72" beam. Another recent addition, the Mirro portable utility house, can be set up in minutes by two men without nuts, bolts or tools.

Mirro is also cooking up such products as roofing, which will consume huge quantities of aluminum, and other building products. More emphasis will also be placed on products for outdoor living and recreation, and on volume components for other manufacturers.

Mirro president Walter F. Bugenhagen recently announced the company's long-range plans through 1970—a program designed to "build volume through new products and new outlets."

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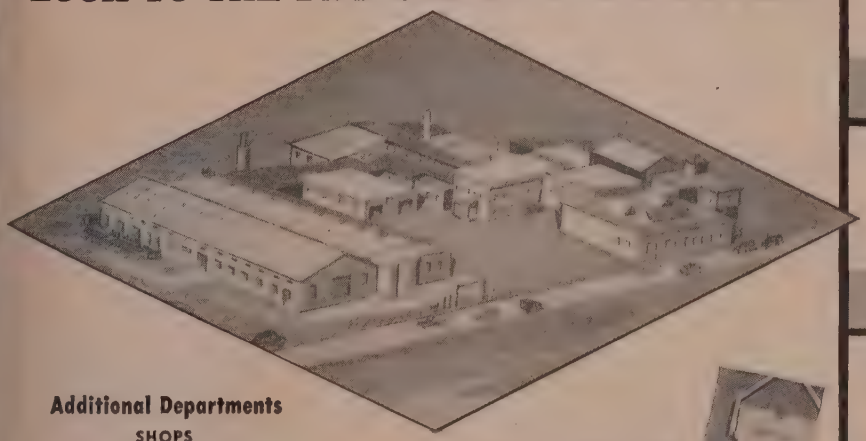

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for hot drawing magnesium sheet

SHWAYDER *Rolls On* THE LUBRICANT

- Heat resistant lubricant, high speed roller coating lin lick problems in mass production of shells for luggage

DISCOVERY of the proper lubricant to facilitate deep drawing of magnesium sheet might solve one problem, but create another—proper application of the lubricant to the work. Shwayder Bros., Inc., leading manufacturer of magnesium luggage, is reaping the benefits of a drawing compound applicator line that is geared to the firm's high volume production of deep drawn magnesium shells for luggage.

Because of its hexagonal crystal structure, magnesium is much more workable at elevated temperatures. This means that any drawing compound used on magnesium must stick to the workpiece and perform its job at these temperatures. For its lubricant, Shwayder settled on No. 3833 Dry Film lubricant, a product of L. R. Kerns Co., Chicago. The nature of this lubricant when diluted at 32 ounces per gallon of water is such that it must be applied at a temperature of 170° to 200°F. for uniform distribution of the lubricant solids on the magnesium blanks.

Another requirement in applying this lubricant to the blanks is that the work must be at approximately the same temperature as the lubricant to achieve the tightest possible bond; at the same time, coating thickness of the syrupy compound should be closely controlled to produce consistent deep drawing uniformity.

This last requirement, coupled with Shwayder's mass production set-up, established roller coating as the most efficient means of applying the lubricant. For this purpose, Black Bros. Co., Mendota, Ill., was called on to develop a special roller coater which would meet all requirements.

The coater is arranged with a standard zero to 4½-inch adjustment of the upper coating roll. The bottom application roll remains fixed, thereby registering permanently with related conveyors. Just before application, the lubricant is released into a reservoir formed between the application rolls and the doctor rolls, which are equipped with leakproof sealing end plates.

Micrometer adjustments for the doctor rolls precisely control thickness of the coating film; at Shwayder Bros. the blanks are given a .002-inch thick coating on each side. The applicator rolls are provided with serrated neoprene covers which cause the lubricant to "stay put" as it is laid on both sides of th blank. A safety control permits instan stopping or reversing of the rolls, an a 1-hp variable speed, handwheel cor trol provides any desired coating spee from 7 to 42 feet per minute.

Special fixtures were necessary on th roller coater to circulate an oil heatin medium through a jacketed tank t maintain the required temperature c the drawing compound. The layou consists of a recirculating pump, to gether with a storage tank for the com pound located on the base of th machine. The compound is pumpe from the storage tank to the reservoi at a rate somewhat exceeding that c application, the overflow moving bac to the tank.

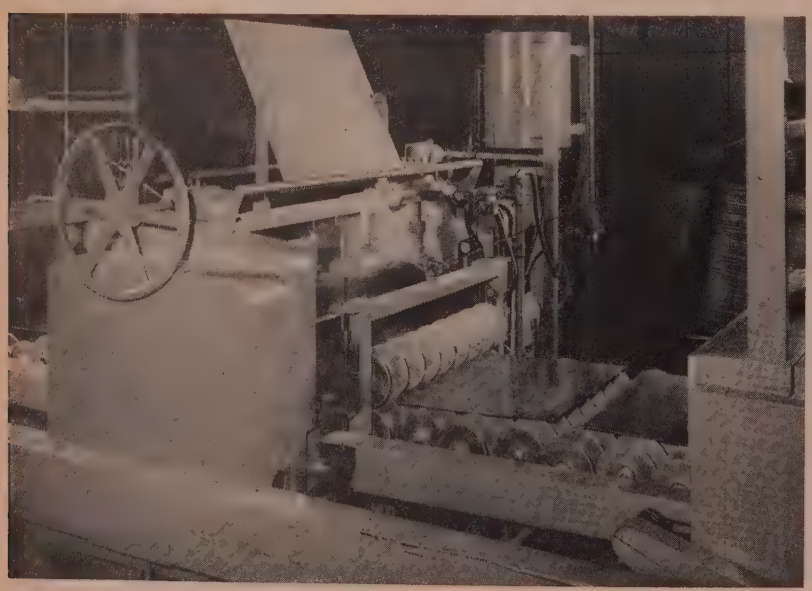
The work is sheared to proper size then fed onto a special disc-type conve or which carries the blanks through th pre-heating oven which raises tempe ature of the blanks to the same tem perature as the compound.

A poor alternative would have bee a dipping operation, allowing th blanks to remain in the heated com pound until they achieved the sam temperature. The oven conveyor more suited to Shwayder's requirement

The oven brings the blanks to r quired temperature just before they pa through the roller coater. From he they continue through another ove which dries the lubricant. Heatin coating and drying take three to fiv minutes.

This coating line can prepare enoug blanks in one shift for a three-shi drawing operation. Shwayder has thr HPM triple-action draw presses—tw 150-tonners and one 200-tonner. Pre dies are heated with Chromolox car ridge elements, and drawing temper ture varies from 380° to 450 depending on depth of draw, die clea ance and thickness of sheet.

A typical draw cycle might be follows: A cold coated blank is plac on the die; the press closes on the blar and dwells for five seconds; the dra operation begins at a rate of 12 inch per minute; and the press dwells f 11 seconds before its upstroke. Tot elapsed time is about 40 seconds.



■ *Lubricant-coated magnesium blanks, emerging from roller coater, pass to the right for oven drying.*

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ALUMINUM SCRAP'S BRIGHT FUTURE

by Carl Burton,
Secretary,
Aluminum Smelters Research Institute, Chicago

With present "proved reserves" of 21 million tons of obsolescent scra as a steadily growing base, the aluminum smelting industry could reac annual recovery rate of over a million tons by 1975 and better than million tons by 1990. Enormous problems remaining to be solved ar cited in speech given at meeting of Philadelphia Metals Association

SMELTING of aluminum scrap on a commercial basis began in 1904. Up to that time, the entire cumulative production of aluminum in the U. S. had reached about 25-30,000 tons, so total scrap could not have been more than 1-2,000 tons annually.

There was no avalanche of scrap in sight to spur the early smelters on, for there had been no great leap in primary aluminum production which constitutes the sole source of scrap, both new and old. In this way the ore reserves of aluminum producers are transferred and become "proved reserves" of the scrap and smelting industries.

The cumulative total of aluminum produced in the 40 years before 1928 totaled but 927,000 tons, and total return of scrap in that period accounted for possibly 300,000 tons. Allowing for losses and destruction, the total amount of aluminum articles in use and subject to obsolescence in the hands of the public in 1928 must have been about 800,000 tons.

Ever-Growing "Reserves"

That 800,000 tons constituted the "proved reserves" of the scrap industry at the beginning of 1928. Such "reserves" are the amount of aluminum in use in all types of goods and articles at any time, which scrap dealers will ultimately handle, and which will be consumed by smelters, in the main.

Unlike other natural-resource based industries, the "proved reserves" of the scrap industry keep growing more rapidly than depletion takes place. These "reserves" have been growing for 75 years at a rate from slow to moderate, but they will, in a relatively few years, reach mammoth proportions.

To my knowledge, only the Paley Commission has been willing to publicly detail the future of aluminum as far ahead as 1975. However, I have dared to chart my calculations to 1990 (see graph). The figures of future possibilities are mine alone, and they are offered only to help stimulate thinking ahead in order to reap the most from the potential they will offer to our industry.

The chart shows recovery from scrap, as vertical columns, yearly 1928-58. The lower gray section of each column represents new scrap; the solid black portion depicts recovery from old scrap. The calibrations along the margins range from zero to 3,000,000 tons, in increments of 100,000 tons. The black curve representing domestic virgin production is of minor interest, yet it does show one interesting fact: in 1934, recovery from scrap was greater than virgin aluminum production.

That phenomenon may never again occur. If it should, it would be only where the economy would be emerging from a long and deep depression which had forced the shutdown of a large portion of primary aluminum facilities.

Note how modest all operations were prior to 1942. In fact, until 1941, annual recovery from scrap had never reached 100,000 tons. Since 1941 it has grown 4½ times to about 450,000 tons in 1959.

With the exception of 1946, '47 and '48, old scrap has constituted a modest portion of total scrap, generally 10-20%. This percentage rose to a high of 47% of total in 1947, reflecting the return of war scrap.

That all of this war scrap was consumed by 1949 is clearly shown by the return to more normal levels in '49, and its continuance since then in the area of 20-25% of total. This relative position should not alter greatly over the next few years, but thereafter it may be expected to accelerate rapidly.

Before projecting the future, remember that in 1928 our "proved reserves" of potential scrap stood at about 800,000 tons. At the end of '58 I think these "proved reserves" had become about 21,000,000 tons.

Looking Ahead to 1990 . . .

So, secure in the knowledge that we are buttressed by those 21 million tons of "reserves," which are being added to yearly and becoming obsolete at varying rates, let us look into the possibilities ahead to 1990.

Except for the first step of six years to 1965, the chart reflects my calculations at intervals of five years. The current year, 1959, is plotted in with total scrap at about 450,000 tons; 350,000 tons from new and 100,000 tons from old scrap.

In 1965, with a calculated total recovery of 668,000 tons, I estimate r covery from old scrap at about 200,00 tons or about 30%. This point, in m opinion, marks the beginning of a lust growth of recovery from old scrap.

Moving on to 1970, with a total r covery of 880,000 tons, recovery fro old scrap should reach about 310,00 tons, or 35% of total. This indicates th accelerating pay-off from our accumu lating "proved reserves."

Further progress is shown in 197 with total recovery mounting to 1,150 000 tons, of which 450,000 tons (35% should be from old scrap.

Old Scrap Dominant by '85

By 1980, out of a total recovery 1,465,000 tons, 44.5% or 675,000 to should be from obsolescent scrap.

The era between 1980 and 1985, i which the aluminum industry will reac its 100th anniversary, will usher in th age in which all past relationship b tween old scrap and total scrap wi have become outmoded. In that perio our growing "proved reserves" wi really begin to produce. In 1985, ol scrap may account for 925,000 tons ou of a total of 1,780,000 tons, or abou 52%. For the first time, old scrap wi account for more than half of the tota

Scrap recovery in 1990 should tot about 2,175,000 tons, of which 1,200,00 tons (55%) should be from old scra At that point our "proved reserves" ma well be 90 to 100 million tons.

The Paley Commission report, issue in 1952, said this about aluminum:

"A demand in the neighborhood 4.5 million short tons by 1975, or near five times the level of consumption i 1950, is considered plausible. Old scra can be expected to constitute an i creasing proportion of supply so th by 1975 it may be furnishing 20% total consumption."

If old scrap is to constitute 20% 4.5 million tons, that means 900,0 tons. My calculation for '75 was 450,0 tons. If you accept the Paley figur then my chart must be changed f 1975 by adding 450,000 tons to t column. We would now have total scra of 1,600,000 tons, of which old scra would account for 56%.

If, over the first 15 years, I have be

- Aluminum
- Brass
- Copper
- Magnesium
- Steel

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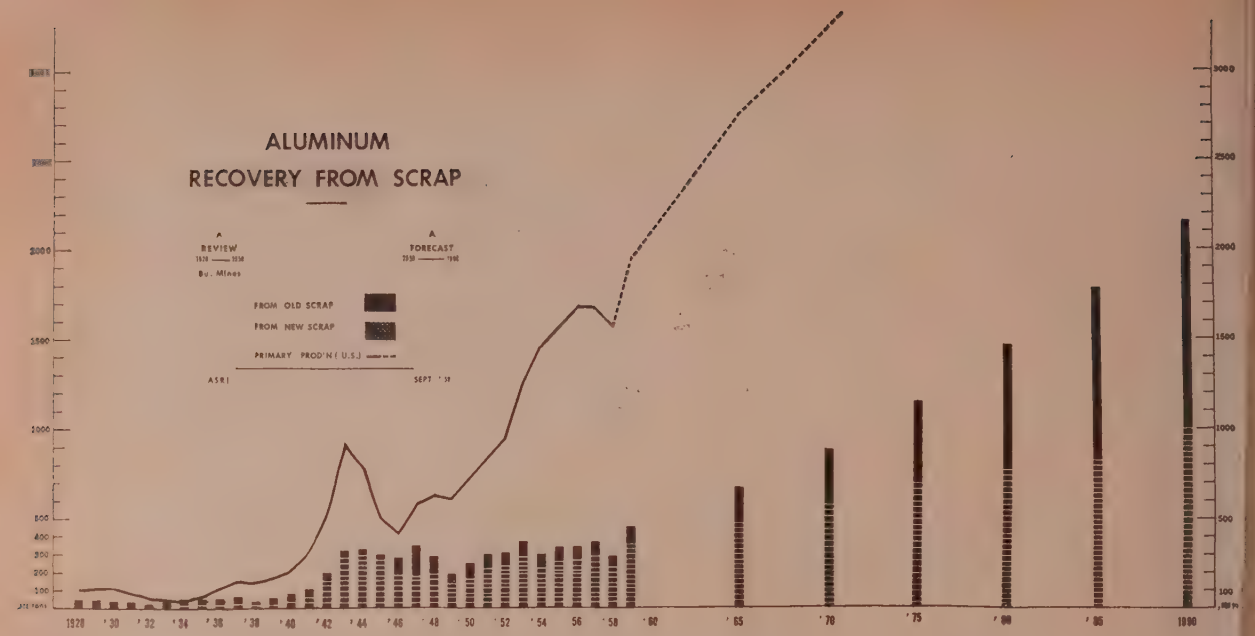
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450,000 tons too low, then it seems reasonable to expect the same direction and degree of error in the second 15 years. Then, in 1990, total scrap recovery would reach the amazing total of 3,075,000 tons, of which 2,100,000 tons or 68% would be from old scrap.

The Paley Commission far outstripped me in optimism as to old scrap supply.

However, regardless of which figures you choose, the potential supply seems almost staggering. There seems little doubt but that requirements will move ahead as fast, or faster, for we will then be supporting a population in excess of 210,000,000, and still growing.

Big Problems, Too

This represents a fabulous opportunity to the scrap industry. But, as with all opportunities, realization will not be automatic; it will hinge on effort, and the solution of many problems.

Some of the problems we will face can be recognized now; many cannot.

Take the matter of space. I have been talking of aluminum scrap, which is only one item in the metal field. Surely the volume of scrap from other metals will be growing at the same time.

Now if the volume of scrap is going to double, and triple, and quadruple, it cannot be handled in congested mid-city areas. That would indicate that wise foresight would lead us to look outward *now* to provide unhampered space for adequate handling and mechanization and growth. I said mechanization, because dealers will find it to be the only way to effectively handle the vastly increased volume.

Nothing indicates reversal of the trend of narrowing profit margins; in fact, all indications point to its continuing. So, with massive growing volume, increasing labor costs, and declining margins, there can be but one chance for survival: That is by broadening markets and effecting greater efficiency in producing and handling. More volume means more inventory, and more inventory means more space. Both mean more capital.

The greatest threat to full realization of the potential is the alienation of the customers of the smelting industry through lack of foresight, by contributing to unnecessary scrap scarcity.

Industries or companies that have always been consumers of smelters' alloys and whose use should grow, are, through fear of inadequate scrap supply and/or instability of price, being driven to primary alloys of either domestic or foreign origin. That is why the aluminum smelting industry opposes unrestricted exports of aluminum scrap until supplies of scrap are ample to reassure domestic industry.

Lost: A Tonnage Customer

I know of one company who until recently had never used primary aluminum but had always been a customer of the smelting industry. This firm's additional requirements over the next few years could be more than covered by the amounts of scrap we are and have been exporting yearly.

After a survey of scrap availability, they assessed inability of scrap to assure them of their needs. They placed their reliance on primary metal — and made a long-term deal for it with a foreign source. Result: A tonnage customer of the scrap industry lost — when all the time we had the scrap to care for their increased requirements. But we shipped it, and more, abroad to serve foreign smelters and their customers.

Who profited? The scrap industry? The American economy? Certainly no the scrap industry, because it did no move a pound of metal that would no have been consumed at home. Certainl not the American economy, for it e ported jobs of American workmen.

The benefit (if any) accrued to relatively few. And what was the tru cost to the entire scrap trade? In m opinion, the *true* cost was the loss o an old customer, for which the entir scrap industry (and our whole economy will keep on paying. The full potentia of our brilliant future cannot be a tained by pushing old and good cu tomers away from our products.

How Many More Will Switch?

If fear of shortages or costs motivate one customer to switch to primary, wh knows how many others might do lik wise? If we shut the gates against ou domestic customers, can foreign marke be relied upon to feel a sense of oblig tion, and consume an equal amoun year in and year out? How long can w expect orderly markets to exist?

No one would object to free flowin exports of raw materials which are i excess supply, but there is no excess aluminum scrap in the U. S. Unless w destroy our own potential market, I s no excess ahead, but rather a comfor able supply to encourage more uses. we do destroy our market then we w have scrap running out of every por

The situation requires the wisdo to recognize that here, at home, lies t great mass market which can endu year after year. If we neglect it and o customers, it will wither.

There is one more fact I would li to emphasize: The quoted price f

Expect something extra in aluminum sheet quality when you order from Olin Aluminum. Expect—and get—material **synchronized with your needs,** at the mill level.

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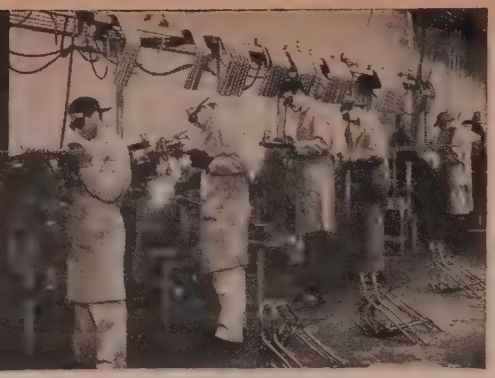

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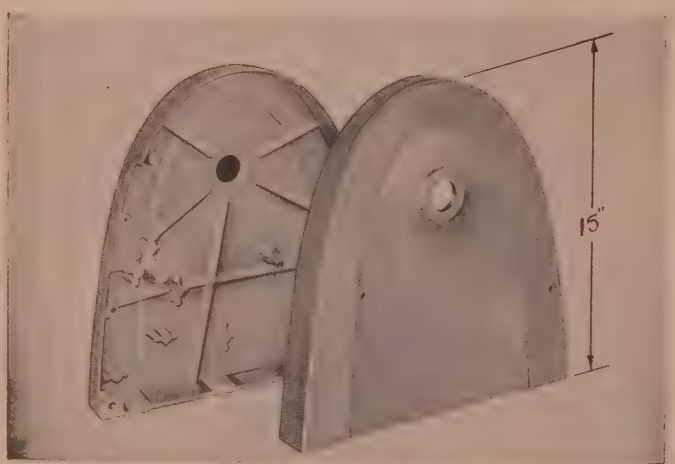

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virgin aluminum pig has no bearing on the price at which a smelter may sell alloys produced from scrap. The price at which primary "hot metal" sells sets a ceiling on a smelter's alloys. If we disregard that fact, the scrap industry is in trouble, for that ceiling can no longer be breached without loss of the business.

Over the past 55 years the smelting industry has been consuming about 75% of the aluminum scrap sold. The smelting industry is the only possible steady mass consumer of scrap in prospect. Therefore, a strong and healthy smelting industry is the greatest assurance of a strong and prosperous dealer body.

Capital Costs Spiraling

If the smelting industry cannot retain its customers and gain new ones, it must pass out of the picture. Under the modern trend of higher costs and narrowed profit margins, replacement of casualties will be most difficult. Where it was once possible to go into the smelting business on a "shoestring," that is no longer true. It costs more today to build one ordinary furnace than was once required for a modest complete plant and working capital.

The increasing complexity of alloys required by industry entails extremely heavy capital outlay for new analytical tools. Constantly rising costs in labor, technical help, supplies, etc., demand more and larger and more complicated mechanical equipment for handling and producing. These costly outlays are positive musts if a smelter hopes to remain competitive.

New capital of the magnitude now required for efficient mass production of precision alloys will not be easily attracted to an industry whose profit margins are shrunken, and whose market has been allowed to deteriorate through shortsightedness and neglect.

The magnificent future I have charted presents a challenge of major proportions. Of these, two spring readily to mind: How are you going to handle the enormous mass of automotive scrap when 7 to 9 million cars may be scrapped yearly, the aluminum content of which may well average over 10 pounds per car?

And what about the rapidly rising use of aluminum foil in food containers and packaging? There never has been a better quality of scrap than that from rigid foil food containers — if they are clean. Since no one has developed an effective way to clean this scrap much of it is lost.

Much work needs to be done on these, and similar problems. They are dealer responsibilities, and each of us will be required to meet our own responsibilities, to justify our right to profit from this most brilliant potential

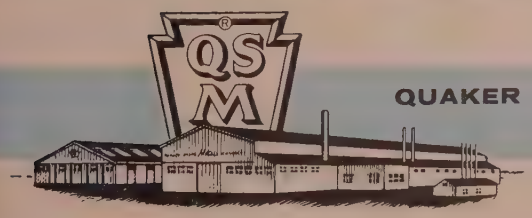
Service is our best Salesman

Technical Assistance is Airlifted from QSM

● If you have problems in manufacturing an aluminum product, QSM will fly to the rescue. Want to know which alloys to use for a new product? What's wrong with the metal you are now using? How to overcome a snag in your production line? What kind of new machinery will serve you best?

Let us know of your problems. We will come up with ideas, information, and the help you need. In emergencies, one of our technical experts can be airborne in a matter of hours.

Naturally, there's no charge for this help. It's a routine part of QSM's service to you—the service that's our best salesman.



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Sectional views of rectangular billet, butt and finished extrusion photographed at the Fruehauf plant.

A production first at Fruehauf Trailer Company!

Rectangular billets extruded on a continuous-production basis

At the modern Fruehauf Trailer plant in Decatur, Alabama, rectangular-billet, high-strength, structural alloy extrusion is a reality. Since its installation in 1957, the Farrel Watson-Stillman 2200-ton press, shown above, has been in continuous production—without alterations or experimentation. As far as is known, this is the first press successfully to produce large extrusions from rectangular billets on a continuous-production basis.

The advantage of rectangular extrusion is that larger sections can be produced on a much smaller press than is required under conventional extrusion methods. At Fruehauf, the 2200-ton press is extruding 12" wide sections from 4" x 14" x 30" rectangular aluminum billets. The sections are used as structural parts for trailers.

Also at this plant, are two other Farrel Watson-Stillman machines—another 2200-ton press and a 1400-ton model, both used for conventional extrusion of smaller aluminum sections. The two 2200-ton machines are unique in that their tools are completely interchangeable. A detwisting-type hydraulic stretcher was supplied for each of the presses. Stretcher capacities are 100, 60 and 25 tons.

Send for more information about Farrel Watson-Stillman aluminum extrusion presses—for either rectangular-billet or conventional extrusion.

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At Fruehauf's Decatur plant, the setup for extruding rectangular billets includes the W-S 2200-ton press and W-S 100-ton detwisting-type stretcher.

4" x 14" x 30" rectangular billet ready for extrusion in the Farrel Watson-Stillman 2200-ton press.

Close-up of rectangular sections being stretched-straightened on the Farrel Watson-Stillman 100-ton detwisting-type hydraulic stretcher.

LIGHT METALS | bounced back in 1959

Awaiting still higher in '60

by K. B. Rhodie, Associate Editor

Though hindered by the steel strike, aluminum is making c strong recovery this year; so are magnesium and titanium More uses and technological gains are sparking the surge

IN SPITE of a 116-day steel strike which slowed sales to several major consuming industries, aluminum made a strong comeback in 1959. The recovery that started late in '58 continued through the first half of this year, with sales and production reaching a peak at around mid-year.

The reversal that set in after July's record sales was not considered a serious development, but rather a natural drop-off following the unusually heavy advance ordering in anticipation of an aluminum strike—which was postponed pending settlement of the steel dispute.

The real upswing started last December when primary production hit a new high of 152,000 tons. Production remained high throughout most of the year. The industry was working at about 80% of capacity in January, and upped this to 90% by June. In mid-1958, on the other hand, combined production was 70% of capacity.

Ingot sales were strong in February. Sheet orders reached their highest point in two years by May, and much the same was true of extrusions. Second quarter aluminum sales exceeded most optimistic hopes. Reynolds announced sales 30% ahead of last year's first half, Kaiser was up 34% and Alcoa expected to net close to $29 million.

Aluminum distributors predicted a 22% increase in their sales of mill products over last year. First quarter volume was 20% above the 1958 level, with second quarter gains still higher. Sales of rod, bar, wire, structurals, tubing and extrusions were expected to gain from 5 to 11% during the year.

Job shop die casters, who had suffered a 30% tonnage decline in 1958 compared with 1957, reported first half shipments running 40% ahead of last year. The American Die Casting Institute predicted a 34% gain for 1959, with further gains in '60 when auto sales are expected to spurt.

More than 912,000 tons of sheet, plate, foil, extrusions, tube and castings were shipped in the first half of this year—a 25% increase over last.

But the effects of the steel strike started to show near the end of the third quarter. August shipments dropped 43% under July. Since then aluminum producers have cut back production.

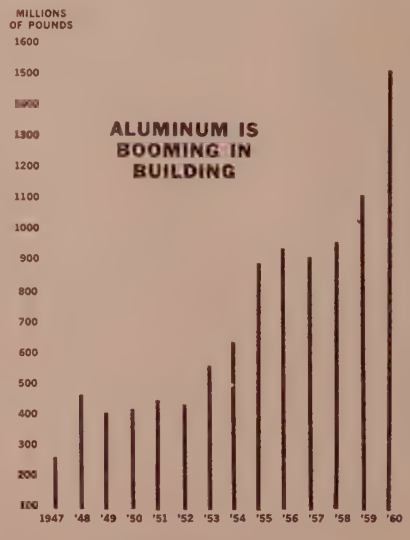
Along about mid-year there was talk of aluminum producers raising prices to recover the two-cent cut they made in 1958, with sheet, extrusions, etc., being upped as much as 20%. But as the steel workers walked out, and aluminum producers waited for the unions to settle, price raising talk died. Once the steel strike is settled there is still the possibility of aluminum being upped anywhere from .7 to 1.3 cents.

Debatable deterrents to price raising are the plans to increase production in foreign countries where low labor costs keep aluminum prices down, especially on mill products.

Titanium has had several price reductions and is competing with stainless steel for chemical equipment applications. Some magnesium prices may eventually be cut, what with a second U. S. producer entering the market and foreign firms offering the metal to some customers at under 30 cents a pound.

Construction Booms

In our November issue we noted that consumption of aluminum in building has quadrupled since 1947, but added that this is only the beginning. Some 7,000 building products firms will have consumed 1.1 billion pounds by the end of the year, and this total should zoom to 1.5 next year, and could hit 2 million tons in the 1960's.



■ *This graph, reproduced from the cover of the November issue, traces the quick, steady rise of aluminum consumption by the building industry. Industry used more than half-million tons this year, and we predict a 200,000 ton increase in 1960.*

Numerous new products, processes and applications have helped the aluminum industry capture more and more of the building dollar, especially that spent on residential homes. While all segments of the building industry are looking to aluminum, 800,000 tons may go into new home construction alone by 1965.

In October, Alcoa made a move to capture a chunk of the galvanized steel market when it announced a substantial reduction in the price of building sheet for both residential and industrial uses. Base price of 100,000 pounds of 0.080 mill finish material in 6 to 12-inch widths is 34.5 cents per pound—roughly five cents under other sheet prices.

Prior to the introduction of building sheet, Kaiser Aluminum, Reynolds Metals and Olin Aluminum had made their bids for galvanized markets by introducing what they call aluminum duct sheet. This product, priced even cheaper than the building sheet (which all aluminum producers except Harvey Aluminum now produce), is stenciled "duct sheet" in an effort to hold it to use to heating and ventilating duct work.

As of this writing it isn't known how effective building sheet and duct sheet have been in capturing new markets for aluminum, but the appearance of these products has created dissatisfaction among sheet rollers and aluminum distributors.

Electrical conduit markets were formerly left to the steel makers, but recently the aluminum producers decided they could not only compete with the steel product, but capture 75% of the market by 1965.

Early this year Kaiser announced two price cuts, dropping conduit's price to about 8% below the initial cost of steel conduit. Reynolds entered the conduit competition late, but now has a promotion program directed at wholesalers in 200 cities, and reports that

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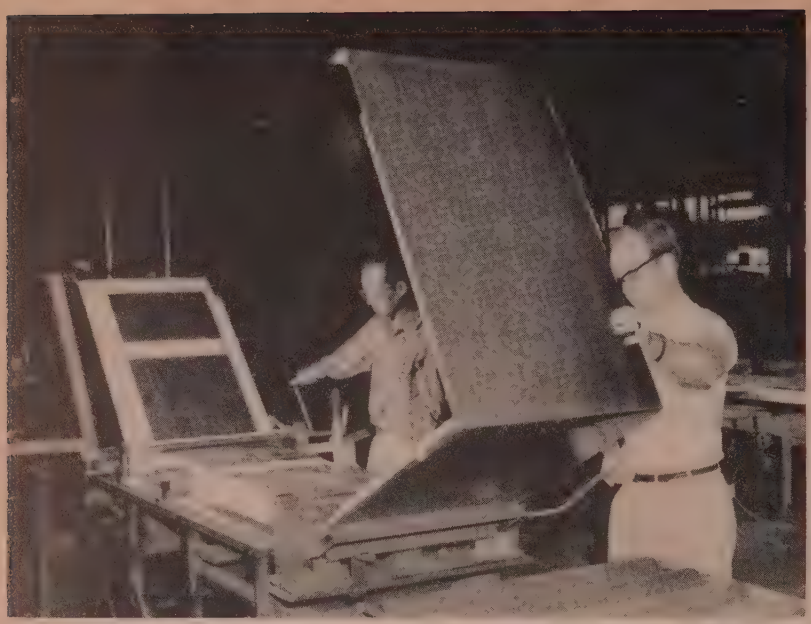


■ *An important new product placed on the market this year was Alcoa's Alpy. It is an aluminum and foamed plastic sandwich material for use in appliances, homes, trailers and mobile homes. It has good insulation value, high strength/weight ratio and dimensional stability.*

third quarter sales almost doubled those of the second.

Aluminum in Autos

Another giant which has increased its use of aluminum, and promises to use much more in the future, is the automotive industry. From bumpers to engines and from roof to wheels, aluminum is finding new applications.

Early in the year auto makers predicted 5.5 million unit sales of 1959 models. Alcoa's commercial research division estimated that the average new car uses 51.5 pounds of finished parts. Coupling these figures means that more than 283 million pounds of the light metal would be used this model year.

The 51.5 pounds per car represents a 9% increase over the amount used in 1958. This does not include replacement parts, estimated at six pounds of aluminum per car life.

Chrysler's Imperial model uses the most aluminum—99.67 pounds. The firm is reported to have started tooling up for 6 and 8-cylinder aluminum engines to power its 1961 line. Chevrolet's new compact car, Corvair, uses little aluminum in body and frame, but is driven by a rear-mounted cast-aluminum engine. Ford Motor Co. uses many die and permanent mold cast parts.

A February article tells how Ford's casting plant at Sheffield, Ala., uses an efficient holding furnace installation in production of die cast aluminum parts. Furnaces have a total capacity of more than 700,000 pounds of hot metal.

Large scale testing is being conducted by the Big Three on aluminum wheel drums. A March article tells the methods used by Kelsey-Hayes Co. to bond aluminum shell drums to cast iron brake liners.

After years of service on trucks and buses, aluminum bumpers are being tested for cars to help reduce weight in the front end, now heavily loaded with power accessories. Some foreign cars already use aluminum bumpers, and several Cadillac models have chrome plated cast aluminum bumper ends.

Army vehicles also represent a tonnage market for aluminum, as detailed in an article in the October issue of Modern Metals. "The estimated 234,000 tons of aluminum that went into military applications in 1958 represented 13% of all the metal shipped that year," the article pointed out. It is estimated that 12,000 tons of aluminum went into missiles in 1959; 18,000 tons into missile support equipment; and 50,000 tons into other ordnance uses.

Consumer Durables Rebound

An important part of the business upswing this year has been the sales surge in consumer durable goods. At the October 1958 meeting of the National Association of Summer Furniture Manufacturers, predictions for 1959 were mildly optimistic. Consensus was that furniture volume would top last year's $2.3 billion by 10%.

One year later, W. W. McTyeire, Jr., president of the Summer and Casual Furniture Manufacturers Association, reported that the sales gain should average 17%. Individual firms reported increases ranging from 12% to 33%.

Typical of the technological advances for the furniture industry is the Alcan Tube-Alloy detailed in the October issue. This versatile alloy does not have to be cold drawn and can be extruded in square, octagonal, triangular and other shapes and then heat treated to strengths needed for furniture.

Last December the Gas Appliance Manufacturers Association forecast a 9% sales rise for 1959. But by April it was saying: "Events of the first quarter make it reasonable to assume that combined shipments of household, commercial and industrial gas equipment will top the 1958 total by nearly 15%."

Early in January a Hotpoint spokesman made a promising prediction for the coming decade, saying appliance sales will increase more than 63% over the span. He looked for 13 million appliances to be sold this year, 16 million in '63 and 20 million by '68.

While appliance manufacturers enjoy the coming ten years, aluminum will reap its profits too, by showing up in more and more products. An example was published in the May issue when we reported on Interstate Precision Products Corp., Anaheim, Calif. The firm took a European conceived carpet sweeper with 21 sheet steel components and redesigned it to use only six die cast aluminum parts.

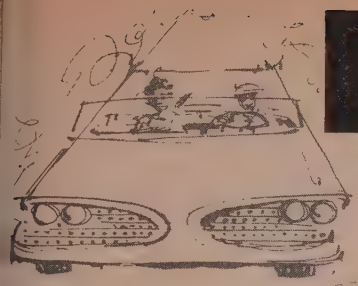
Power mowers, most of which use substantial quantities of aluminum, have showed good gains this year after the industry suffered its first setback in 1958. With most of the big selling over, an executive of Lawn Boy Division of Outboard Marine quoted an 18% increase in orders over last year.

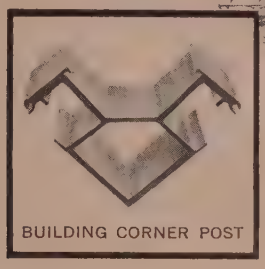
Aluminum Containers

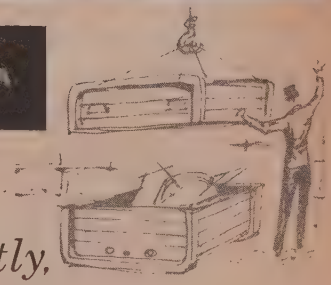
Major strides toward the acceptance of aluminum cans for beer and oil were made this year. In February, Modern Metals published a story about the Coors impact extruded aluminum seven-ounce beer can. Slugs are punched from continuously cast aluminum strip and fed into an extrusion press which turns out 3600 seamless containers an hour. In August, Gunther Brewing Co., Baltimore, announced that it was marketing beer in a seamless drawn can fabricated from aluminum sheet.

National Can Corp. has a 25-million unit contract with Reynolds to supply Esso Standard with cans for lubricating oil. The firm uses modified tin-plate can making machinery when forming 0.010-inch aluminum sheet. Production procedure and salvage plans are detailed in a February article.

A June report tells how Kaiser produces 80,000 deep-drawn one-quart cans for packaging synthetic lubricating oil for Navy jet engines. And the wide acceptance of Continental Can's program of offering one-quart aluminum oil cans at the same price as steel prompted the firm to extend the offer past the







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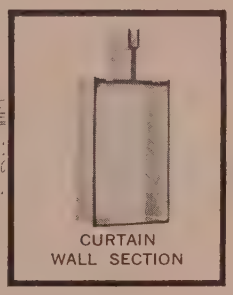

Most products made with aluminum use extruded components. Aluminum extrusions are easy to fabricate, reduce material and assembly costs, permit design flexibility, and provide the many favorable characteristics of strong lightweight aluminum.

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EXTRA LARGE SHAPES — Sections designed within a maximum circumscribing circle diameter of 32 inches.

EXTRA LONG SHAPES — Aluminum extrusions in heat-treatable lengths up to 80 feet.

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EXTRA SERVICE — Fast, efficient and flexible, backed by a completely integrated operation from primary pig to processed parts.

These extra advantages are available to improve your product . . . at no extra cost. Just specify Harvey Aluminum Extrusions. The best way to start? Call the nearest Harvey Aluminum office. Or write Harvey Aluminum, Torrance, California.

A major independent producer of quality aluminum in all alloys and sizes: Pig, ingot, billet, rod and bar, pipe, tube, hollow sections, press forgings, forging stock, hand forgings, impact extrusions, electrical bus bar, structurals, special shapes, light and heavy press extrusions, screw machine and other aluminum products. Similar products in titanium, zirconium, and steel. HARVEY ALUMINUM SALES, INC., Torrance, California

HARVEY Aluminum

August 1959, deadline through 1960. Shipments of 200 million units is expected by the end of this year. A Reynolds' spokesman estimated that 51 tons of metal is used for every million cans manufactured.

Technological Developments

Technological developments that helped fabricators find many more ways to put light metals to work came on the scene this year in the form of new equipment, alloys and processes.

Many types of new welding machines showed up, offering various ways of joining aluminum. The April issue introduced a mass production brazing unit, and ultrasonic and electron beam welders.

To eliminate grinding operations and excess handling of parts, Selas Corp., Dresher, Pa., developed a brazing machine for joining spouts to coffee pots. The machine produces a uniform fillet which looks like the parent metal.

High frequency sound waves are used by Aeroprojects Inc., West Chester, Pa., to join metals previously thought to be unweldable. The firm's Sonoweld ultrasonic spot welder can join aluminum, copper, nickel, stainless steel, molybdenum, tantalum and niobium.

An electron-beam welder developed by Air Reduction Co., New York, joins reactive and high-melting point metals such as beryllium, molybdenum, tantalum, zirconium and hafnium.

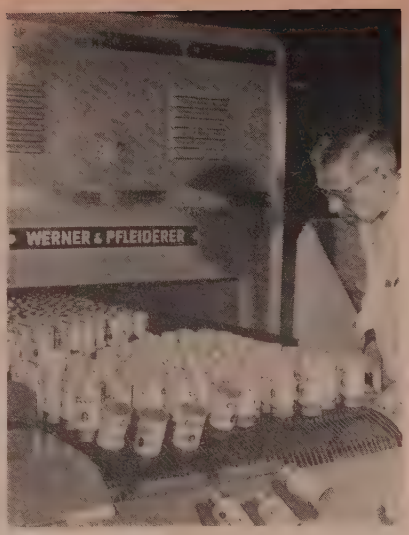
New ways of welding aluminum tube and pipe were also introduced. New Rochelle (N. Y.) Tool Corp. has Thermatool which produces ferrous and nonferrous tubing at a 250-foot-per-minute rate. And Aluminium Ltd. introduced a portable unit which uses a consumable electrode when automatically making circumferential butt welds on aluminum pipe.

Other aids to aluminum welders are angle cutting attachments made by Wallace Supplies Mfg. Co., Chicago. Attachments are interchangeable surface plates for Wallace cutting machines, and come with charts to help operator select setting.

Alcoa aluminum alloy X5557, reported in February, provides lustrous anodized finishes and comes in coiled or flat sheet as well as circles, blanks and plate.

Another new alloy is a ductile aluminum for casting in any type of mold. Adaptaloy, produced by Federated Metals Division of American Smelting and Refining Co., has a tensile strength of 22,000 psi, yield strength of 8000 psi and 7-11% elongation.

New aluminum welding wires have also been made available. Air Reduction's A5556 can be used in the Tig (tungsten-inert-gas) or Mig (metal-inert-gas) welding of alloys 5083, 5086 and 5456.



■ ***Seamless beer cans at a rate of 3600 per hour roll off assembly line at the Adolph Coors Co., Golden, Colo. Seven-ounce aluminum cans are impact extruded from slugs punched out by a blanking press. Coors' cans weigh 40% as much as comparable tinplate containers.***

All-State Welding Alloys Co., White Plains, N. Y., has a new bright-finish aluminum filler wire called Bright Wire Fillerarc. The wire is extruded to insure cleanliness.

And still more developments—Asarco produced a zinc-base die metal (Formaloy) said to have high impact and tensile strength and uniformly fine structure. Reynolds unveiled No. 33 wrought aluminum tooling plate for applications in which three-dimensional machining is involved or where the surface is contoured. Reynolds also has No. 33-HC Reycote with a hard anodic coating for drill jigs, mill fixtures, etc.

Several new processes were highlighted in the February issue. One is for plating aluminum with chromium. Service Hard-Chromium Co., Union, N. J., developed the process which produced a strong adherent bond with good ductility.

Aluminum enamel frits, used in porcelain enameling, are being produced in flake form by Ferro Corp., Cleveland. Advantages are increased uniformity, superior suspension in slip form, decreased aging, and greater workability.

Kroy Metal Products, York, Neb., is continuously forming, welding, finishing and cutting irrigation pipe at the rate of 1500 feet per hour. Gordon and Morgan Machine Co., Lincoln, designed the equipment which takes in 0.051-inch aluminum sheet at one end and turns out 4, 6 and 8-inch diameter pipe at the other.

Loma Machine Mfg. Co., Inc., New York, developed Lomatic, which produces 200 feet of aluminum rod per minute. One man runs the high-speed integrated line which straightens, cold draws, cuts and polishes 3,500 pounds of ⅝-inch rod an hour.

Joe Hunter of Hunter Engineering Co., Riverside, Calif., developed a short cut to sheet which was reported in March. Molten aluminum is cast directly into ¼-inch thick reroll sheet in a continuous casting process. The cast and coiled sheet is ready to be rolled down to high quality sheet.

An extrusion press that sheaths cable continuously and a high silicon alloy for use in aluminum auto engines also were covered in Modern Metals. In August we told of a cold extrusion process for strong alloys.

Titanium

Titanium, seemingly out for the count in late 1957 and early 1958, has made a good recovery this year due to steadily lowered prices, wider application, development of new alloys and the stepped-up missile program.

In December, Modern Metals predicted titanium would regain some of its 1958 losses. This was based on continuing reduction in prices plus the frequency and quantity of inquiries received by fabricators during the year. Also, the Douglas DC-8 jetliner program was expected to use 215,000 pounds a year.

Further price cuts were noted in January when Crucible Steel made changes which it felt would cut costs of some finished items by 10 to 12%. Last month, the firm slashed the per pound cost of billets and plate by $1, bars and strips by $1.25, and sheet and wire by $1.50. These reductions represent an 8.8 to 17.3% savings.

In May we reported that "titanium mill products are in greater demand than at any time in the past two years. March shipments totaled 644,000 pounds vs. 477,000 for February, and the upturn is continuing. Total shipments for the first three months were 20% over the 1958 level. Biggest increase is for sheet, plate and strip. Ingot production was also up. Total for March was 1.3 million pounds."

Another boost came when DuPont shaved 22 cents off the price of Grade A-1 sponge and 20 cents from Grade A-2. This helped titanium edge a step closer to stainless steel.

While price reductions were taking place, producers were busy trying to improve their product. The aircraft industry tested an ultra-high temperature alloy, MST 881. It was being groomed for compressor shafts in Mach 3 jet engines.

The metal was being put to new uses, too. Van der Horst Corp., Olean, N. Y., found titanium tubing the most practical material for heating and cooling coils used in 25% chromic acid plat-

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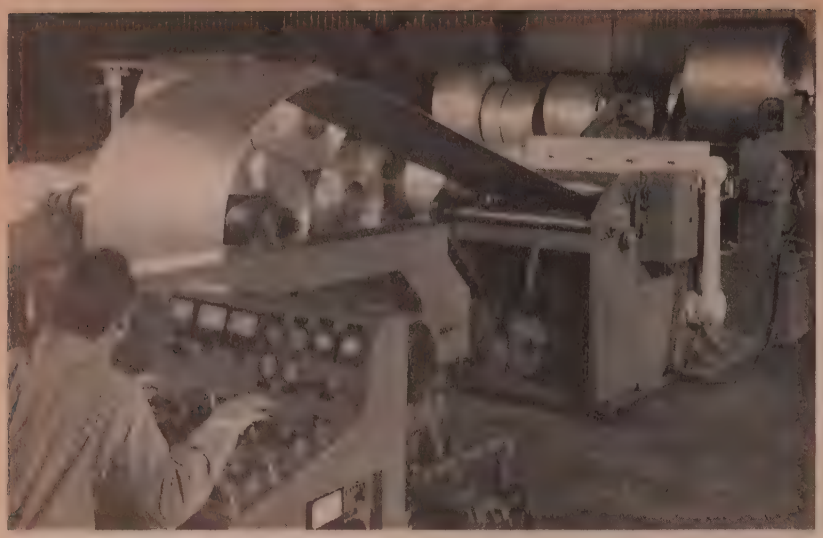

■ *This is part of continuous sheet casting process which converts molten aluminum directly into high quality quarter-inch reroll stock. Joe Hunter, president of Hunter Engineering Co., Riverside, Calif., is inventor. March article pointed out that installation cost is fraction of that of conventional hot mill.*

ing solutions.

As the price of titanium continued to drop the metal's high strength weight ratio and relatively high corrosion resistance became more enticing to manufacturers of chemical processing equipment currently using stainless steel. An article in the March issue tells how General Electric Co. puts it to this use.

Magnesium

Magnesium suffered in 1958, too, but we looked for this light metal to rebound. At the end of the first half production was about 5,000 tons behind last year, but shipments of wrought products hit 1065 tons in August—highest monthly total since May, 1957. September totaled 903 tons, while the second quarter's 2,845 tons was the best recorded in two years.

Increased consumption of magnesium this year is mainly due to the accelerated missile and rocket program. However, fabricators have found many other applications, several of which were reported during the year.

January's issue told of magnesium frames for snowshoes; February, a lightweight scaffold; March, camera parts and cases for missile and torpedo batteries; April magnesium fans for planes; and May, magnesium containers for electronic and other applications.

A January article tells how Dow Chemical Co. is selling auto makers on the use of magnesium tooling plate. An October report described a two-stage development program that created a thin cast magnesium landing gear for a fighter plane. By switching to precision magnesium extrusions, Harris Seybold realized a large saving in machining time on two parts for its paper trimming units.

Introduction of new alloys with properties unobtainable elsewhere also helped increase consumption of magnesium. Dow came out with three: sheet and plate alloy ZE10A requiring no stress relief after welding; HM11XA for die casting about 500°F; and EK31XA developed for sand casting to 450°F.

The first primary producer to challenge Dow in the magnesium business started operations in September in Selma, Ala. Alamet is jointly owned by Calumet and Hecla Inc., Chicago, and Brooks and Perkins Inc., Detroit. Yearly production is 7000 tons of high purity magnesium produced from dolomite using the ferrosilicon process.

Aluminum Abroad

While aluminum production and consumption flourishes in the U. S., foreign producers are also turning out more aluminum and have plans in the offing for even more production facilities.

Norway, for example, produced 120,000 metric tons last year—a 25% increase over 1957, primarily due to the opening of a new 22,000-ton smelter. Norway expects to produce 215,000 metric tons by 1965. Most of this will be sold on the world market.

The primary production capacity of India was more than doubled by the opening in February of a new smelter by Indian Aluminium Ltd. It has an annual capacity of 11,200 tons, cost $10 million, and is part of a $30 million integrated expansion project involving bauxite, alumina, smelting and fabrication of aluminum.

Kaiser has joined forces with G. D. Birla, one of India's top industrialists, to establish Hindustan Aluminum Corp., which will build and operate a 20,000 metric ton plant in Central India.

Foreign dollars are pouring into Africa to build up an aluminum industry on the dark continent. Cheap water power and unskilled labor plus large bauxite deposits lead backers to believe they will be able to cut costs 10% under the world average.

Reynolds and eight other foreign firms are surveying the advantages of production in the Belgian Congo. Kaiser, Olin Aluminum and Aluminium Ltd. are exploring the possibilities in French Equatorial Africa, while private French interests are doubling Africa's only going plant, located in the Cameroons, which has a 45,000-ton capacity. Guinea and Ghana offer other areas for aluminum production.

Olin is planning a 480,000-ton alumina plant at Fria, Guinea, and plans are being drawn for Mexico's first aluminum facility.

Japan will produce 105,000 tons of aluminum this year, but still will not have enough for its needs. Remainder will be bought from U. S. and Canada. Russia also has a shortage, and it will probably last for several years. Soviet leaders told their Congress earlier this year that original plans for tripling production would be inadequate.

Special Issues

During the year we devoted three issues to special topics and named "The man of the year in the light metal industry."

The June issue dissected Alcoa, showing the reader what makes a "billion dollar baby" tick. The September issue told "How to finish aluminum," creating a demand for reprints of the entire feature section. These 36-page reprints are now going on sale at $1.00 each.

The November Modern Metals tried to cover the exploding use of aluminum in the building industry.

September covered the various ways to clean and finish aluminum, including mechanical and chemical finishing, anodizing and plating, porcelain enameling, and sundry organic coatings for aluminum. A directory listed finishing supply sources and a special survey revealed how 327 plants clean and finish aluminum.

James R. Price, chairman of the board and chief executive officer of National Homes Corp., was named "Man of the year" in our January issue. When National unveiled its line of aluminum sheathed prefabricated homes late in 1958, Modern Metals said: "National's dramatic move is expected to trigger an eventual industrywide trend to aluminum in new homes and hasten prefabrication's gains in home building."

Indications are that both our selection of Price and our prediction of the coming importance of aluminum in the construction industry will prove out.

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6 GOOD QUESTIONS ABOUT ALUMINUM FINISHING . . .

If you have a question about aluminum finishing, the chances are your Kaiser Aluminum Distributor can answer it. Experience and metal know-how are as much his stock in trade as top quality aluminum. Use his fund of technical knowledge, backed by the engineering ability of Kaiser Aluminum's field staff.

Here are the answers Kaiser Aluminum Distributors have given to specific questions about finishing aluminum asked by various fabricators. If you don't see the answer to your question here, ask *your* Kaiser Aluminum Distributor.

Q. We're tooling up for a new design having a frosted finish. What's the best way to get a frosted appearance on aluminum?

A. Etching with an alkaline solution is the most common method of producing a frosted finish on aluminum. A 5.0% solution of sodium hydroxide, or a solution containing 5.0% sodium hydroxide plus 0.5% sodium fluoride, can be used. The temperature of the solution and the time allowed for etching are determined by the degree of etch desired. Aside from etching, you could polish the aluminum surface with an extra fine abrasive cloth, or air blast with fine abrasives.

Q. Technically, what is anodizing and how thick is an anodized coating?

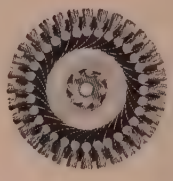
A. Anodizing is an electrochemical finishing technique that works like this: Aluminum is made the anode in an electrolytic cell containing an acid electrolyte, such as 15% sulfuric acid. The surface of the aluminum is converted to a hard, corrosion resistant film of hydrated aluminum oxide. After the oxide film has formed, it may be converted, by a very simple procedure known as sealing, to a more definite crystalline form of aluminum oxide with increased corrosion resistance. By varying the anodizing conditions, different thickness can be achieved. Normal commercial thickness ranges from 0.0003" to 0.0009".

Q. We're using alloy 5005 sheet and extrusions. What alloy or alloys will give us a good color match for anodizing?

A. The chart in Figure 1 will show you color matches for various aluminum alloys at a glance.

Q. How can I polish a contoured aluminum surface

A.



One of the best methods is to us a brush-backed, motor drive polishing head as shown here The abrasive cloth is serrate and is located in strips alter nately between the brushes. A the polishing head revolves th brushes adapt themselves to th contour and the abrasive clot does the polishing.

Q. Is surface preparation necessary before paintin aluminum?

A. Since an aluminum surface does not naturally hol paint (has no "tooth") it is necessary to prepare th surface before painting. Two general methods ar used: (1) Chemicals combined with the primer t etch while the primer is drying, and (2) Etch th surface with chemicals first, then apply the paint i a conventional manner. Usually the application of primer is advisable to minimize paint failure. Th paint used should be top quality, but avoid lead base paints.

Q. Which abrasive do you recommend for polishin aluminum — carborundum or aluminum oxide?

A. If no subsequent finishing is required, good result can be obtained with either. However, if the alu minum is to be given a final anodizing treatment imbedded polishing residues from carborundum (silicon carbides) will often produce mottled, dark ened surfaces. In such cases, it's best to use alumi num oxide abrasive to avoid such discolorations.

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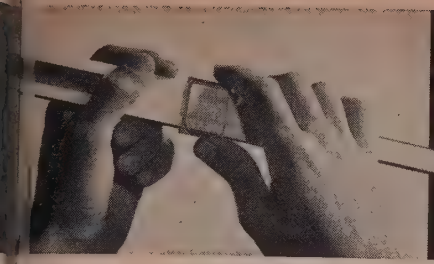

AND 6 GOOD ANSWERS BY KAISER ALUMINUM DISTRIBUTORS

Fig. 1

APPROXIMATE COLOR MATCHES OF ANODIZED ALUMINUM ALLOYS

O — Relatively Good Matching X — Better Matching

	Sheet and Plate Alloys											Extrusion Alloys				
Sheet and Plate Alloys	1100	2024*	Alclad 2024	3003	5005	5050	5052**	6061	Alclad 6061	7075*	Alclad 7075	3003	2024*	6061	6063	7075*
1100	X	O	X		O					O			O			O
2024*	O	X			O								X			
Alclad 2024	X		X													
3003				X								X				
5005	O	O			X	O	O	X		O			O	X	X	O
5050					O	X	O	O		O				O	O	
5052**					O	O	X	O						O	O	
6061					X	O	O	X						X	O	
Alclad 6061									X		X					
7075*	O				O					X						X
Alclad 7075									X		X					
Extrusion Alloys																
3003				X								X				
2024*	O	X			O								X			
6061					X	O	O	X						X	O	
6063					X	O	O	O						O	X	
7075*	O				O					X						X

* Heat treated and quenched. ** For relatively thin anodic coatings, i.e., not exceeding 20 min. anodizing time.

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MAGNESIUM'S MARKETS

PAST • PRESENT • FUTURE

Magnesium Association paper cites outstanding military and commercial uses as the super-light metal emerges from developmental into marketing stage.

by James S. Kirkpatrick, Vice President
Brooks & Perkins, Inc., Detroit

ELEVEN years ago, Dr. Willard H. Dow, president of The Dow Chemical Co., introduced the booklet, "How Magnesium Pays," which outlined 43 possible uses for magnesium.

Today 30 of these items are in use; 16 have worked successfully, but are not in use because another material underbid magnesium; and only seven were technically unsound. Dr. Dow's faith in magnesium has been more than justified.

Magnesium consumption has risen from 11,947 tons in 1949 to about 42,000 tons in 1959—a 352% gain in ten years. While this is not the tonnage that many of us would like to see, it disproves the judgment of the pessimists who predicted that magnesium would fade out of the picture.

In 1959 as much magnesium was used in alloying with other metals as the total consumption in '49. Approximately 25% of all magnesium consumed is used in aluminum alloys. With the 5000 series of weldable aluminum-magnesium alloys becoming more popular, this insures greater use in this bread and butter application.

Recent statistics indicate the following magnesium end uses for 1958.

	Short Tons
Structural Uses	
aircraft & missiles	9800
consumer products	2300
electrical & electronics	1400
machinery & tools	2300
material handling	900
surface vehicles	800
graphic arts	250
misc.	670
	18,420
Non-Structural Uses	
electrochemical & chemical	5,000
alloying other metals	11,415
metallurgical	7,900
powder	420
misc.	40
	24,775
TOTAL	**43,195**

Russia and its satellites are producing about the same amount of magnesium as the U. S. and nearly half of the total world output. Our information indicates that uses in the U.S.S.R. are very similar to those in our own defense industry. Their engineers and metallurgists appear to be highly qualified magnesium technicians.

In Aircraft . . .

Probably no single vehicle has ever used magnesium more successfully than Convair's B-36 bomber. From 1941 until the bomber was retired this year, several hundred were built. Magnesium alloys were used extensively in the skin, internal structure, engine parts, etc. Service experience has been satisfactory.

Before the B-36, many engineers and designers were skeptical about service life, corrosion, and fire hazard involved when using magnesium in aircraft. By 1954, acceptance of magnesium by the Air Force was established.

During the past ten years hardly an airplane has been built which does not use magnesium. The Boeing B-52 bomber contains magnesium alloy extrusions, forgings, sand castings and sheet for a total of about 3600 pounds.

This is probably the last of the subsonic bombers. The new bombers such as Convair's B-58 are reaching supersonic speeds which preclude the use of magnesium in heat affected zones. Since the new materials for the airframe are quite dense, weight reduction in the nonheat-affected parts is more critical than in subsonic aircraft. Magnesium can find enough uses internally to make up for what it might lose in the skins, leading edges, etc.

■ *Stator blades of Chevrolet's Turboglide transmission have been made of magnesium for the past two model years. Extruded magnesium replaced aluminum because of a three-to-one advantage in drilling speeds.*

Over 20,000 jet engine pods for the B-47 bomber have been built of magnesium alloy and operated successfully for the past seven years. These units fly out in front of the jet engine and have taken some terrific beatings, but service life has been highly acceptable.

The Republic F-105, like nearly all other current fighters, utilizes a large amount of magnesium. The new supersonic fighters will use increasing amounts of heavy materials, which should indicate the need for reducing weight in parts not affected by aerodynamic heat.

Much of the structure of the Ryan Firebee is magnesium sheet and extrusion. This target drone is recovered from salt water after being shot down. Careful finishing has resulted in excellent serviceability of the magnesium.

The tail cone, gun turret, and radar housing of the B-47 also use a great deal of magnesium. These units take high structural loads both under flight vibration and during the firing of the high powered guns. Their service life has been excellent.

Mr. M. G. Childers has listed some materials that would be of value in the next family of supersonic jet commercial airliners. The materials he considers usable for the 400-800°F. range are the magnesium-thorium alloys, aluminum powder metals, titanium, the corrosion resistant steels, low alloy steels, nickel base materials, beryllium, molybdenum, and vanadium. Note that the magnesium-thorium alloys are classed as temperature resistant.

. . . and Automobiles

Probably the greatest testimonial to magnesium is its use in the crankcase and transmission housing of the Volkswagen. Probably 3 million of these en-

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■ *Some 400 pounds of magnesium sheet and extrusions are used for the Metro-Lite truck body. These 1200-pound bodies are the lightest in the delivery truck field.*

gines have been built in the past 13 years. The tremendous acceptance of this economical car in the U. S. probably contributed a great deal in making auto makers conscious of the weight in cars. The acceptance of light metals by the auto industry could be one of the greatest boons to the magnesium industry.

The Mechanical Mule made by Willys is the first tactical vehicle capable of carrying more than its own weight. This is accomplished through the use of magnesium which comprises 17½% of the 900-pound dry weight of the Mule. This vehicle is in full scale production.

Indianapolis racing cars use magnesium body panels, instrument panels, wheels, and other parts. In the 1958 race, all cars had magnesium wheels, brake anvils, differential housings, and steering gear housings. Use of magnesium in winning cars in the 1959 race was even more extensive.

The stator blades of the Chevrolet Turboglide transmission have been made of magnesium in the past two model years. Close tolerance shaved magnesium extrusions replaced aluminum because of the three-to-one advantage in drilling speeds. Approximately 150,000 cars have had this turboglide stator in magnesium which means that some 3 million of these blades have been in successful operation for nearly two years. Their service record has equaled or surpassed any material used previously.

The Metro-Lite truck body (see cut) contains 400 pounds of magnesium sheet and extrusion. Weighing about 1200 pounds, it is the lightest body of comparable dimensions in the delivery truck field. It weighs about 200 pounds less than in aluminum, and 780 pounds less than in steel. It has only 1/3 as many parts as the steel body of the same measurements, and is more rigid, and the lines are cleaner and straighter. For the manufacturer, production is faster. For the user more cargo space is obtained.

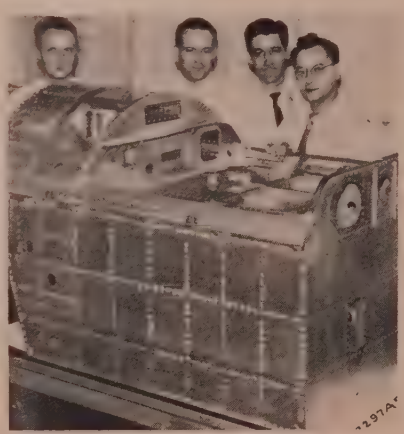
Millions of magnesium die castings have been used by the auto industry in the past seven years. When used in the area of the engine, sufficient oil vapor deposits on these castings so that no finishing is required. When decorative treatment is required, normal painting is sufficient.

Magnesium die castings are often lower in piece price due to all or any of the following factors:

(1) The high speed at which magnesium can be machined means many more machined parts per hour; (2) tool life is much longer than with any other metal; (3) more shots per die can be made in magnesium; (4) greater stability of the part after machining reduces rejects due to warpage; (5) since no stabilization of the die casting is required, the user does not require the large inventories which might be required in aging other materials; (6) the cost of shipping parts is reduced.

Magnesium offers the auto industry an immediate step toward lighter weight components in a readily available material which is often competitive in price. A few examples of the successful use of magnesium die castings are fan spacers, steering column parts, fuel pump parts, bezels, covers, and housings.

The American motorist's desire for more miles per gallon, lighter weight and higher performance indicates the possibility of many additional magnesium die castings. Once the automotive engineer becomes familiar with magnesium and accepts it other applications will follow.



■ *Over 40 different ZK60 alloy extrusions and AZ 31 sheet are used in this navigation case which holds the Sperry inertial system in the B-58 jet bombers. It's one of the largest airborne electronic components ever built in magnesium.*

In Consumer Durables . . .

Shwayder Bros. luggage has been made of magnesium for the last few years. Nearly 2 million of these cases are in use, and have taken the roughest treatment that can be given to luggage.

Well over half a million McCulloch chain saws have been used all over the world, under extreme conditions of exposure to jungle humidity, arctic low temperatures, etc., and laying in the snow or out in the rain. The acceptance of this lightweight die cast magnesium saw ten years ago was almost instantaneous.

Camera parts made from magnesium die castings possess the necessary strength and also simplify fabrication by eliminating a substantial amount of machining and forming. Magnesium ladders have been used successfully for many years. A 24-ft. ladder weighs 28 pounds in magnesium, compared to 63 pounds in wood. And magnesium does not rot, warp, or splinter.

Magnesium dockboards have been in use all over the world for over 15 years. They add tremendous efficiencies to material handling operations and eliminate hazards in moving dockboards from one truck or car to another.

. . . and Electronic Gear

Over 100,000 Signal Corps telephone switch boxes with magnesium cases have been manufactured and have stood up under rugged use in all climates.

Many internal parts of the Kleinschmidt teleprinter are magnesium castings. One ten-year-old unit has operated 51,000 hours—17 times the 3000 simulated life test.

The Sperry doppler inertial system (see cut) is one of the largest airborne electronic components ever built in magnesium. It is 20% lighter and 37% more compact than former, less versatile systems. It uses AZ31 sheet and over 40 different ZK60 alloy extrusions. Because of the very close tolerances required, dimensional stability is very important.

In the tracking lens for the Nike missile system, the vanes are made of AZ31B alloy sheets, the spacers are AZ31B extrusions, and the rim is AZ31

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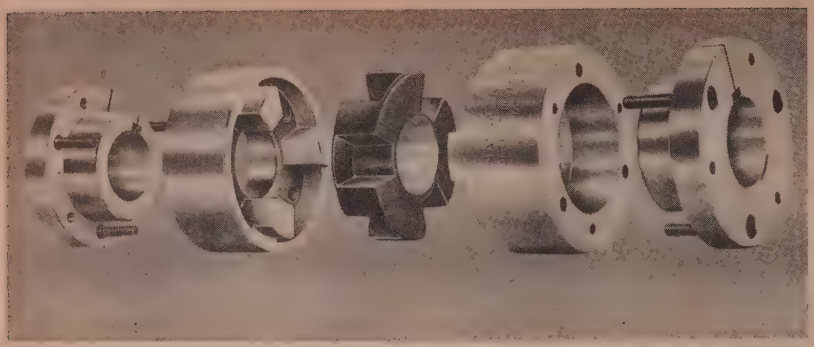


■ *Flexible drive couplings represent a new application for magnesium. Over 30,000 of these components have established an exceptional service record in the past two years, giving no appreciable load to the drive.*

formed sheet. Magnesium performs very well in tracking lenses, because of its light weight and damping qualities.

Two problems that have held back magnesium in the electronics field are the inability to soft solder the metal, and the difficulty of obtaining RF shielding connections. However, a number of magnesium electronic covers, modules, etc., have been plated with zinc, copper, or tin, and can be soldered as readily as copper or brass. Of course, RF shielding is no longer a problem. This solution of the soldering problem opens a wide field for magnesium in electronics.

The Arma ICBM guidance computer case is fabricated entirely from magnesium extrusions. It is very light in weight, but strong enough to withstand high vibrations and shock loads.

The primary structure of the radar antenna pedestal for the Raytheon Hawk missile system consists of two large magnesium castings. More magnesium assemblies are being planned for this type of highly mobile unit.

With a metal as versatile as magnesium, many new uses are being developed every day.

Lightweight magnesium checking fixtures are used extensively in the aircraft and automotive fields. Precision styling tools built by Norton Equipment Co. illustrate magnesium's "no droop" qualities. Thus, a fixture does not work so hard to hold itself up, thereby guaranteeing extremely fine accuracy for body styling and layout. Engineers are studying this type of equipment in conjunction with optical tooling.

Magnesium photoengraving plates have proven highly successful in high speed rotary printing. Copper and chrome plate are added for wear resistance. Since magnesium does not cold flow under repeated pressures, it is an ideal material for this purpose.

Aerial delivery systems made of magnesium have proven highly successful. Parachute drops of 24,000-pound loads have been made. Magnesium is an excellent structural material for this most rugged application.

A new and unusual application is in flexible drive couplings. Over 30,000 of these units (see cut) have been in use for the past two years with an exceptional service record. Magnesium eliminates compensating for mis-alignment, and gives no appreciable load to the drive. Model 910 for a 4⅝" shaft weighs only 48 pounds. A standard steel coupling of this type weighs over 200 pounds, and requires material handling equipment during installation.

In the missile field, magnesium works exceptionally well in any area where severe aerodynamic heating does not occur. The Hughes Falcon (GAR-1) is one of the high production air-to-air missiles using magnesium extensively.

The Martin Mace typifies a high percentage of structural use of magnesium alloys, and the Boeing Bomarc uses an exceptionally high amount of magnesium-thorium alloys. NASA and NACA have long used magnesium in their supersonic and hypersonic test missiles. Weight is extremely critical in any missile, whether it is a ballistic type or a guided missile to put a space vehicle in orbit. Hardly a missile is flying today which does not have many components or structures made of magnesium. The Titan Missile has 40% of its skin covered with magnesium-thorium alloys.

The first satellite planned by the U. S. was for the Vanguard program. This sophisticated missile had a 1-to-1000 payload-to-vehicle ratio. The satellite was an all magnesium structure and skin. While troubles were experienced in the early firings, three Vanguard satellites are now in orbit.

Nearly all satellites put in orbit by by the U. S. have used some magnesium. The Thor Discoverer satellite uses over 600 pounds of magnesium.

While space hardware will never be a volume production item, it does open the door to many highly sophisticated applications of metal. Since no moisture exists in outer space, the corrosion problems which have plagued metals for centuries will be minimized, thereby reducing expensive finishing systems.

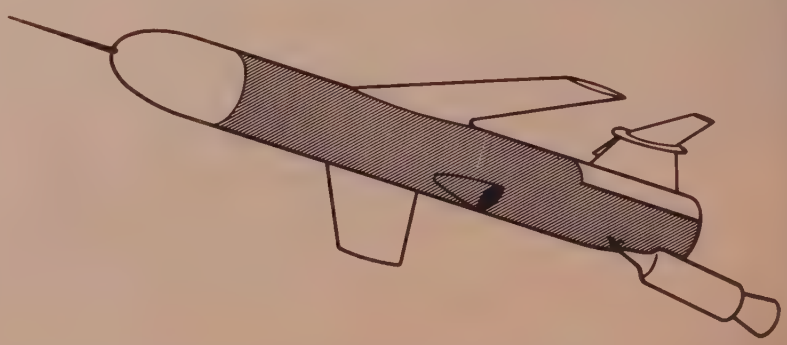
Tested applications which might be used in space vehicles would be extruded structurals, skins for the outer covering, control panels, ventilator housings, electronic cabinets, tables, furniture, flooring, conduit, black boxes.

Since many space platforms will not have the problem of re-entry, only the smaller vehicles which carry materials out to them and return to earth will have to be built from high temperature resisting metals.

Conclusions

The preceding discussion illustrates that magnesium has become a common engineering material to many forward thinking technical people. It can be purchased in almost any required form. It is readily welded, economically machined, and above all, offers weight reduction over heavier materials. No other metal has ever been so readily available. Volume production can reduce costs to the point where magnesium will be competitive for many new applications on an economic basis.

Magnesium salesmen now have more than adequate examples of how this metal has done the job better. Enthusiastic selling in order to educate more and more people is the pattern of today's industry. As in any other metal, technical people will continue to find improvements. The development period is over; the day of marketing has arrived.



■ *The Martin Co.'s Mace, an Air Force missile, uses 640 pounds of magnesium sheet (shaded portion) and 26 pounds of magnesium sand castings.*

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ALUMINUM FOIL MILL USES . . . . .

X-RAY THICKNESS GAUGES

. . . . . TO HOLD TIGHT TOLERANCES

ALUMINUM foil is sold by the pound, but used by the square foot. If the thickness varies even slightly on, say, a 6,000-pound coil of foil, the actual amount of coverage can be well under what it should be. The customer does not get full value for his purchase price. That's why thickness control is so important in the production of aluminum foil.

To obtain highly accurate thickness readings without marring the finish of aluminum foil, Reynolds Metals Co. uses non-contact, x-ray thickness gauges capable of measuring foil thickness at speeds up to 6,000 feet per minute.

At Reynolds, the x-ray gauges were installed on break-down mills where the heavier passes in the foil-rolling process are made. These mills process 6,000-pound coils which are gauged at .008-inch or thicker before they are rolled. The foil is usually finished at .001-inch or thinner. The x-ray gauge measures in a range from .0007 inches to .012 inches, plus or minus 1%.

Reynold's first non-contact, x-ray thickness gauge was installed in 1958. Since that time, the company has installed three additional XactRay gauges at its Richmond, Va. plant. A fourth unit has been ordered from Industrial Gauges, Daystrom, Inc., designers and manufacturers of the x-ray thickness gauge.

Reynolds also depends on the XactRay gauge for precision measurement at its aluminum foil plant in Louisville, Ky.

All of the x-ray gauges used by Reynolds are equipped with strip chart recorders which collect thickness measurement data and provide an accurate and permanent record of the aluminum foil measured. According to Robert Campbell, plant engineer, "the recorded data can always be reviewed should a customer question the specification on a particular order."

The recorded data is accepted as scientifically accurate. "Like the recording on a police radar screen, the strip chart doesn't leave much room for debate," Campbell said.

In processing foil, the mills are set to handle coils that vary from 25 to 65 inches wide. A generator transmits a controlled beam of x-ray energy through the aluminum foil being rolled. The amount of transmitted energy is detected by an incident unit. Electronic elements in the console cabinet convert and compute the energy into terms of thickness variation. An indicator mounted on the console supplies the operator with a reference point so that he can accurately compensate for deviations.

Before the XactRay gauges were installed, thickness measurements on aluminum foil were taken from edge-cut samples checked with a micrometer. While this technique provided accurate readings, operators had to develop a special skill just to obtain samples.

Since foil thickness is affected by any change in rolling speeds, the mill couldn't be stopped and started several times just to obtain a representative sampling. The edge cuts had to be obtained while the metal was being rolled through the mill.

Now, the x-ray gauge takes a continuous reading. The only time it shuts off is when there is a break in the sheeting; this automatically turns off the equipment.

The new gauge also eliminates the possibility of marring the foil, one of the disadvantages inherent in contact gauges previously used to measure foil thickness. With the new equipment, there is no possibility of damaging the finish.

As a premium consumer packaging material, foil must be delivered with its mirror-bright finish sparkling clear. Appearance is equally important for the most popular consumer application, Reynolds Wrap household foil. Aluminum foil is also specified for thermal insulation and as a conductor for condensers.

■ *Reynolds foil mill operator (left) cuts tail on aluminum reroll sheet prior to threading it around rewind roller on break-down mill. Closeup at right shows XactRay gauge mounted between 4-high rolling mill and idler roller. Idler roller maintains level of sheet as it passes through the non-contact, x-ray gauge. The generator and incident unit are positioned well below and above working rolls so that damage to the x-ray unit is minimized should a sheet break while it is coming off the mill.*

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Price controversy simmers as

PRODUCERS PROBE FOR NEW SHEET MARKETS

Seeking new and bigger outlets for their enormou sheet rolling capacity, the primary producers hav brought out two new, low priced products. Inde pendent sheet rollers could be hit hard, but th producers point to the need to become increasingl competitive with steel.

By H. K. Darby, Associate Editor

DUCT sheet and building sheet are the latest bones of contention in the aluminum industry. Introduction of these low priced products by primary aluminum producers has touched off reactions ranging from alarm on the part of independent sheet rollers to resentment by the younger primary producers who must match the products in order to stay competitive. Some observers believe the development will lead to much broader use of aluminum; others view it as a step backward.

While duct sheet and building sheet are expected to at least choke off penetrations by imported sheet, current recriminations revolve around such questions as whether the products will jeopardize the position of various specification sheet products; whether "upgrading" of the low-priced products will occur at the expense of spec sheet; and to what extent the producers "police" their sales of duct and building sheet.

Duct sheet started the ruckus. Early in 1959 Kaiser Aluminum decided to challenge galvanized steel in the heating and ventilating field. To do this, the aluminum sheet would have to be priced competitively with galvanized.

This would require no physical specifications beyond the ability to take a Pittsburgh lock seam. Finish and flatness would be run of the mill; alloying data would not be published.

[Many observers claim that Kaiser's duct sheet sales to a limited group of heating and air conditioning duct manufacturers was merely an expansion of aluminum commodity price practice.]

Reynolds Metals Co. countered Kaiser's move by hurrying its duct sheet into the entire heating and ventilating market and selling it through distributors.

Kaiser's initial price of coiled 36-inch wide duct sheet was 30 cents a pound, delivered, in gauges .032, .025 and .019. Reynolds went a step further by matching this price in gauges .040 through .016 and in 12 through 48 inch widths. With perhaps a few slight variations, these are the prices at which duct sheet is presently offered by Kaiser, Reynolds and Olin Aluminum.

The flat sheet price is 33.2 cents. Coiled, cut to length, is 31.2 cents. (The latter has coil set removed, is not "flattened" or stretcher-levelled.)

To limit the use of duct sheet to the heating and ventilating field, the material is embossed, or coined, continuously with the words, "Aluminum Duct Sheet," running the length of the coil. As a new safeguard to keep the metal from straying into other uses, the producers are reported to be changing the direction of the emboss to diagonal. And when distributors sell the product, they are supposed to certify that it is sold only to the heating, ventilating and air conditioning trades.

How's It Going?

As of this writing there is little to indicate how aluminum duct sheet has been received; the producers are noncomittal, and statements by sheet metal firms are contradictory. The product has probably made some penetration, however.

In attempting to gauge duct sheet's success at this early stage, it should be remembered that users had plenty of time to stock up on galvanized. Perhaps the 116-day steel strike did not produce the favorable climate anticipated for aluminum duct sheet.

However, Charles Reddick, chief of the Building Products Division of the Business and Defense Services Administration, said that aluminum sheet "has been finding increasing use every year." This is to be expected, in view of the growing acceptance of aluminum in the building field. "It appears to me that at least during this period, with galvanized unavailable, it would have accelerated use. To what degree isn't known."

Noting that "a tremendous amoun of ductwork is formed on the job in addition to the stuff that is prefabri cated," he said that this makes accurat surveys of consumption difficult. "Thing definitely favor the aluminum pro ducers," he continued. "Everybody in the heating business stocked tremendou inventories of galvanized, and many o them haven't been hit with a shortage But just because the steel mills are pro ducing again doesn't necessarily mean that fabricators are off the hook."

Misgivings By Some

Whether or not duct sheet has gained a foothold in the heating and ventilat ing market, its introduction is viewed with misgivings by some informed indi viduals who doubt that certification o use will be effective. It has been noted that some distributors have failed to mention the need for certification in their own duct sheet bulletins.

"I don't see what's to stop a sheet metal shop from putting the stuff into hog pans, beer cooler liners, etc.," one aluminum user said.

There are other aspects of the duct sheet situation, however.

Perhaps as many people in the heating and air conditioning industry ap prove of aluminum for ductwork as disapprove. Their opinion is that when aluminum is properly fabricated and installed it is no noisier than galvanized and just as effective.

The "horror stories" about aluminum ducts usually originate with people for whom a move to aluminum would be too much trouble (there is also a possibility that many small and medium size sheet metal shops have less trouble in costing galvanized jobs).

Aluminum utility sheet, the duct ma terial of 10 or 11 years ago, was very popular with many big sheet metal

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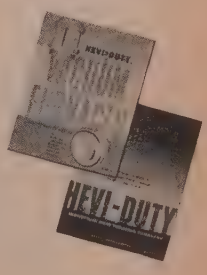

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HOW MUCH CHEAPER IS ALUMINUM DUCT SHEET?

Figures below represent the price differential between duct sheet and other aluminum sheet products, based on minimum carload lots of 30,000 pounds.

	.032"	0.24"/.025"	.019"/.020"	.016"
Specification—Coil	$3300	$3390	$3720	$4140
Specification—Flat	4350	4500	4710	5220
Utility—Coil	3180	3270	3600	4020
Utility—Flat	4050	4200	4410	4920
Building Sheet—Bare Coil (100,000# Base)	1350	1500	1650	1800
Building Sheet—Bare Flat (100,000# Base)	1590	1740	1890	2040
Building Sheet—Bare Coil (30,000# Base)	1650	1800	1950	2100
Building Sheet—Bare Flat (30,000# Base)	1890	2040	2190	2340

fabricators, and won many of them away from galvanized on a price basis. Unfortunately, the primaries didn't hew to the line, and lost out.

Duct sheet's price seems "too low" only until one realizes that aluminum can stock is priced even lower; yet nobody complains about this. Aluminum can stock prices were established to compete with steel, the same objective of the aluminum producers with duct sheet today. Of course, the can manufacturers wouldn't re-sell this stock.

As one primary producer's spokesman put it, "Either you have a market or you don't have it. Duct sheet was priced to compete with galvanized, and it isn't hurting anyone except Big Steel."

Said another large sheet roller: "These new products have caused us to scramble around in a search for more economical production methods. The result is, we're still able to compete."

And Then Building Sheet

Alcoa didn't take to the duct sheet idea. It came out with building sheet, a non-spec material thought to approach alloy 3004 in composition. But Alcoa's standard building sheet is Alclad, priced at 35.5 cents a pound for coiled .024 and .027-inch thickness in 100,000 pound quantities. The price goes to 36.5 cents for .016-inch material; .032-inch is 35 cents. Bare building sheet is half a cent cheaper.

The minimum order is 30,000 pounds, and quantities up to 99,999 call for a one-cent extra. Other producers—Kaiser, Reynolds, Olin, Anaconda and Revere—soon put the same product on the market. The sheet is unmarked and its sale is unrestricted.

The average price of building sheet is about 37 cents a pound. With duct sheet about 6 cents a pound less, these are entirely different products.

When Alcoa introduced building sheet, it also cut the price of reroll stock from 32.5 cents to 30 cents a pound. The lowest priced reroll (¼-inch hot rolled band) is 28 cents. Very few firms are equipped to use it.

Comments of many aluminum firms reflect the general confusion as well as the bitterness and suspicion that is directed toward the primary producers. Naturally, the independent sheet rollers are the most vocal because they are immediately affected.

"For many years our company has operated on the re-roll principle, and we've seen this thing coming for a long while," commented one man. "It indicates the immaturity of fellows who have to sell the output of mills that are vastly over-developed capacity-wise. We've had many problems with the big producers, but this is the worst."

Another sheet roller considered building sheet "a realistic approach," noting that its price "brings into the open what has been going on 'under the counter' for years, and practiced by all of the producers. And it will put the quietus on foreign sheet.

"But this duct sheet is an absurdity," this sheet roller continued. "Imagine selling the stuff at 30 cents a pound without a gauge differential. At $5000 below the carload price of spec sheet, one could do a lot of things to make this a very worthwhile buy. Duct sheet is priced too low."

Two representatives of European producers admitted that the new prices are hurting importers. One said he would have to price sheet 3 cents a pound under what he has been getting for it, but was told that he could go no lower than 1.5 cents below "normal" aluminum prices.

What adds to the importers' troubles these days is the upturn in European aluminum business.

"We will lose some of our spec sheet business," another integrated sheet roller complained. "People will make the maximum effort to re-design products in order to realize the pound-price saving. It sure puts the big squeeze on our margins." Still another considers sheet price too low, "but we don't fear it if they restrict its use to those areas for which it is supposedly designed."

In its announcement, Alcoa said: "Where adaptable, assuming physical properties, flatness and finish are suitable, this product replaces alloys 1100, utility, 3003, 3004, 3005, 5005 and 5050 and others previously used in many building products." The product list accompanying this article gives a good idea of the huge scope of the aluminum building products field.

In this regard, the comments of a residential siding manufacturer reveal a facet of the building sheet situation which has received too little attention.

This executive of a million pounds-a-month-plus user of 3003 sheet declared that "We're not committing ourselves to building sheet when the primary producers refuse to reveal its metallurgical content. I don't know and they can't tell me.

"I'd be a fool to risk our reputation by using aluminum which might deteriorate on homes and cause demands for adjustment. The sheet we now use conforms to published specifications which are our protection. I've been assured that building sheet will give us the same performance, but salesmen often give assurances only to get that order."

Although this big user has ordered a small "trial quantity" of building sheet, he feels that he cannot rely on production quantities of the material, even if his experimental batch proves okay.

How Can You Paint It?

He looks askance at the producers' published statements that building sheet "is supplied as mill finish only. The appearance may vary from bright to dull within a sheet or between sheets. Discolorations or streaks resulting from oil or water stains, oxidation or heat marks are not causes for rejection. Scratches, pits, roll marks, rolled-in scratches, dirt or coating, light scattered slivers and blisters on the surface, to the extent that the structural properties or workability are not impaired, are likewise, not considered causes for rejection."

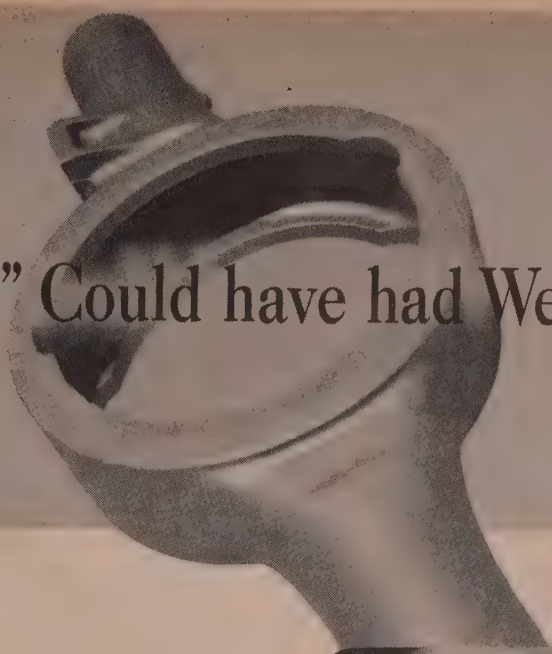
He further pointed out that differences in the mechanical properties between 3003 and building sheet impose a decided risk.

"Alloy 3003 has a specified ultimate tensile strength of 26,000 psi in 3/4 hard temper, but the building sheet is said to have a UTS of 34,000," he explained.

He also had no knowledge of the building sheet's weight. He might have to buy more pounds of it in order to get the same footage yield. Finally, FHA aluminum siding specifications might not cover building sheet. "How could I use this stuff safely, even if it proved workable?"

Questions as to where the product

The "Banjo" Could have had Weak Spots



Casting made by Riverside Foundry for gear housing of four wheel drive truck.

Casting this gear housing presented problems. Yet it had to be sound because it was destined for service in rugged, four-wheel drive trucks.

To be sure that it would be ready for its job, the Riverside Foundry, Bettendorf, Iowa, x-rayed the pilot castings. The radiographs showed shrinkage and dirt inclusions. Changes in casting technic followed. Radiography proved the difficulties were overcome.

This is another example of how radiography quickly points the way to sound production—provides assurance that only high-quality work is delivered.

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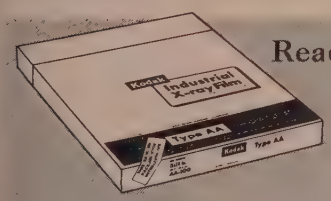
Radiograph reveals shrinkage and dirt

X-ray Division . . . EASTMAN KODAK COMPANY . . . Rochester 4, N.Y.



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TRADE MARK

is used and what sheet alloys it replaces are vital questions for non-integrated sheet rollers. They probably cannot make building sheet profitably because its low price is too close to the cost of re-roll sheet plus their conversion cost.

If building sheet does replace some alloys mentioned in the Alcoa announcement, some of the non-integrateds can look forward to dark days.

They can buy .125-inch coiled 3003 alloy re-roll stock, 17 to 60 inches wide, in the as fabricated temper, for 30.7 cents a pound.

Some Margin Here, But . . .

Assume that the material is re-rolled to .024-inch sheet. Book price of this is 41.3 cents a pound, thus allowing a 10.6-cent margin. Scrap generated will give him a little more of a cushion, but not much.

But .024-inch coiled building sheet costs 34.5 cents a pound (100,000-pound quantity), while .125-inch building sheet re-roll stock costs 30 cents a pound. Here the operating margin for the sheet roller would be 4.5 cents a pound.

"Re-rolling cost runs from 6 to 8 cents a pound," a mill executive said. "If you are running on a 48-inch mill, have only one slit, and generate no scrap, this might be reduced to 4 cents a pound. A 94% recovery in rolling and slitting is possible but mighty uncommon. In most cases, recovery amounts to 80%.

"Added unit costs average 1½ cents a pound for freight, and 2½ cents for general overhead (salaries, office costs, and the cost of selling)."

Will the low priced sheet sink some of the independent sheet rollers? The affected companies certainly talk as though their days are numbered.

Those companies that are strong financially will surely find ways to raise efficiency, cut their overhead, and thus stay in business. Only one thing is certain: Alcoa, Kaiser, Reynolds and the others—with plenty of problems of their own—will not yield to the loudest complaints of the independents. Charitableness is not a common trait in business.

The integrated, independent sheet roller is in a somewhat better position. Such companies as Nichols Wire & Aluminum Fairmont Aluminum, and United Pacific Aluminum have either hot rolling lines or continuous sheet casting equipment melting facilities, which enable them to control their costs to some degree.

The integrateds may face slimmer profits in some areas, but companies like Nichols and Quaker State Metals Co. have profitable building product lines. Quaker State is already operating a hot line and is about to complete its new casting plant.

The aluminum distributors have their gripes, too. They can buy duct sheet and building sheet but are not allowed the usual functional discount, and cannot take these products on consignment.

"I doubt if this duct sheet will catch on," one distributor said. "It has already failed once, and the producers haven't done a damned thing to change it. It's still not as good as galvanized, and it costs more. Maybe aluminum will hold some business after galvanized returns to the market, but galvanized is still better for ductwork."

Building Sheet Applications

- Interior partitions
- Range hoods
- Switch plates
- Mail boxes
- Lamp bases
- Gutters, down spouts
- Wall tile
- Shutters
- Gable end louvers
- Flashing
- Prefabricated chimneys
- Coping
- Display racks, cases
- Kitchen cabinets
- Curtain wall panels
- Window louvers
- Industrial roofing, siding
- Siding accessories
- Residential siding
- Acoustical ceiling panels
- Roofing and shingles
- Mobile home roofs
- Elevator panels, trim
- Hand rail panels
- Ice chests
- Air conditioners
- Dehumidifiers
- Storm door kick plates
- Garage doors
- Storm window frames
- Cabanas
- Patio roofs
- Screen frames
- Awnings
- Soffit
- Expanded metal

One big Chicago sheet metal shop agrees, though this firm considers aluminum in a good position at 30 cents a pound. "But we've never had much call for aluminum." The company's inventory of galvanized is still plentiful, and a stock of aluminum utility sheet purchased some years ago remains in the racks.

"Our customers specify galvanized," an executive of this firm said, "so we use galvanized. Anyway, to match the rigidity of steel with aluminum would call for heavier gauges that send the price up."

But a distributor who takes such a dim view of duct sheet believes that building sheet has possibilities, even though it will eventually eliminate some of the common alloys. He believes that many fabricators are buying spec sheet where it isn't essential.

"Who needs four common alloys that do the same job?" he asks.

Last month, aluminum distributors convened in California and got a few complaints off their chests. Representatives of the primary producers were on hand to defend a new position (building sheet) and present *their* views.

The low-cost product is designed for applications where finish is not important—where it would be painted or otherwise hidden, was one defense. It would be ridiculous to think that the producers would make a product which might interfere with sales of higher priced alloy or 3003 sheet.

One NAAD member complained that the minimum order of 30,000 pounds was too low, enabling almost anybody to buy building sheet and compete with distributors. Another complained that producers' salesmen were promoting the low priced sheet to his customers for many applications heretofore calling for spec sheet.

This is called upgrading—making improvements in the non-spec product for applications hitherto requiring a spec sheet. It might include leveling; annealing, even inspection whereby the better looking sheet is selected for an order.

Upgrading might even be interpreted as a case where building sheet is sold with the assurance it will do the same job without additional finishing. Example: The recently reported sale of building sheet for fin stock.

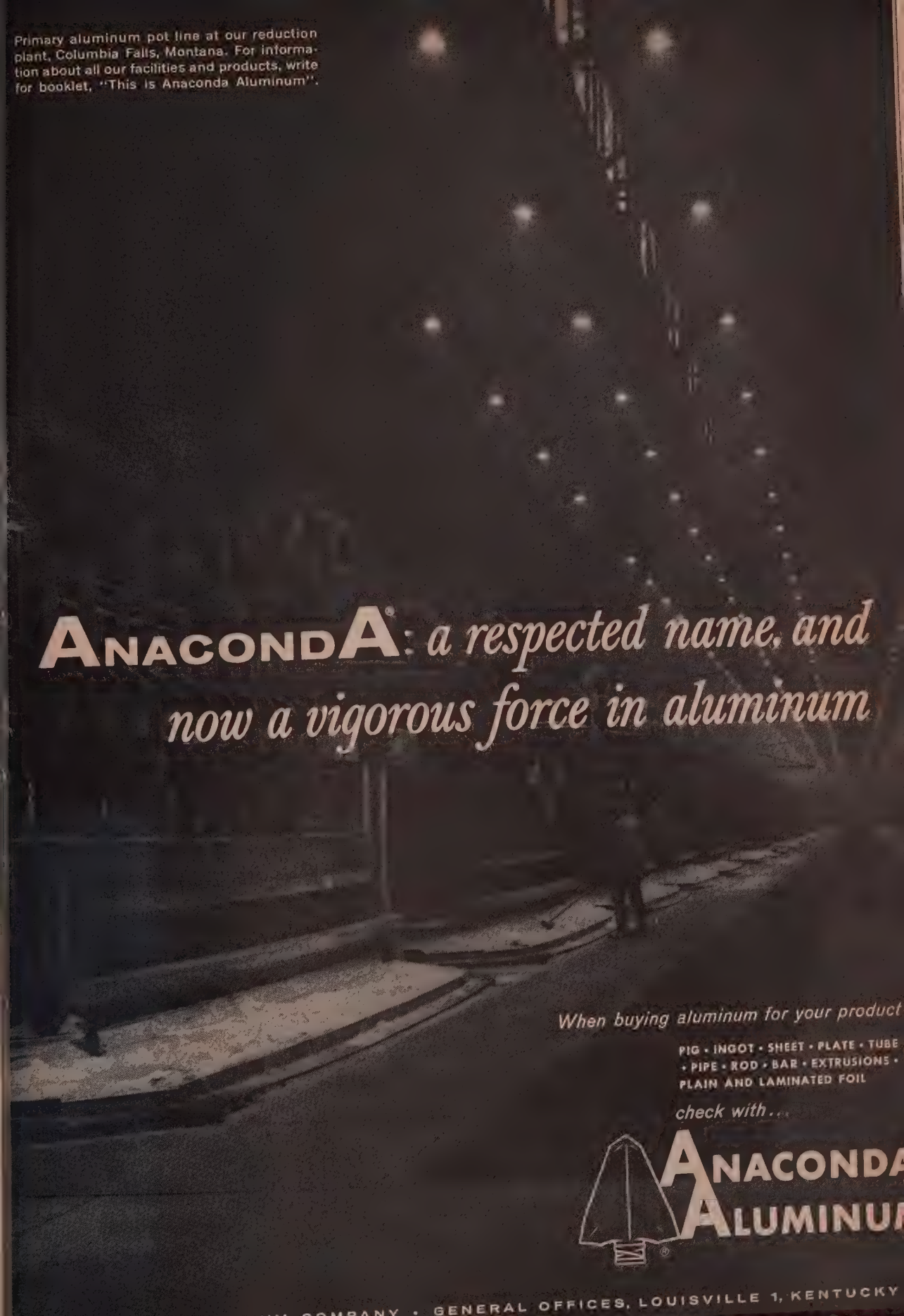
One large multi-million pound aluminum user who has bought spec sheet in the 5000 series exclusively has been approached by representatives of most of the primary aluminum producers and offered building sheet that will meet his requirements, and at the building sheet price. Needless to say, he is interested.

Here to Stay?

Some observers insist that duct sheet, as such, will be short lived. Some cite its too-low price; others contend that offering it on a preferential basis is illegal.

It looks as though the sale of building sheet will not be controlled. Aside from the hardships it will create among independents, and the reduced profits of producers and distributors, building sheet might in time encourage broader use. Already, huge quantities of the low priced sheet are reported to have been ordered as a replacement for painted steel in air conditioning cabinets.

In the meantime, it is hard to believe that aluminum sheet mills will not be subject to considerable pressures from other big specification sheet users to come up with a commodity price for *them*. It wouldn't be the first time.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MODERN METALS SURVEY REVEALS

339 metalworking plants will use 33% more aluminum in 1960

Poll of over 2000 subscribers also uncovers extensive expansion and new products plans; reflects generally bullish outlook among firms that fabricate aluminum or use it in making end products.

by F. L. Church, Senior Editor

TYPICAL EXPANSION PLANS

Of Companies That Replied to Modern Metals' Questionnaire

Type of Expansion	Products Made	Estimated Al Use In '60 (lbs)	Increase Over '59 %
Anodizing, polish, paint equip.	Shapes, tube, trim	4,000,000	0
Warehouse, tool and die shop	Comb. doors	5,000,000	25
Extrusion billet casting equip.	Architectural, appliance, automotive parts	35,000,000	16
Foundry	Threadless pipe fittings	350,000	58
Extrusion press	Extrusions	8,000,000	
Building, extrusion press	Prime windows, comb. windows, doors, extrusions	18,000,000	50
Fabricating equipment	Pipe, tube, bldg. products	8,000,000	33
Drawing equip.	Welding, brazing wires	350,000	24
Addition to rolling mill	Wire, screening	6,000,000	50
More equip. in shell core section	Castings	450,000	28
Extrusion presses	Extrusions	15,000,000	25
More casting area	Die, sand, perm mold cast.	40,000	60
Alumiliting equip.	Extrusions	12,000,000	0
More space, extrusion press	Grilles, registers, etc.	2,250,000	18
New plant	Foil	7,750,000	8
Extrusion press	Extrusions, windows	11,000,000	80
Plant, extrusion press	Extrusions, windows	6,000,000	20
Extrusion press, anodizing line	Trim, extrusions, edgings	4,500,000	25
Extrusion press, billet facilities	Windows, extrusions	5,000,000	180
Roll forming, coating, casting, extrusion, hot & cold rolling equip.	Building products	60,000,000	72
Melting, billet casting equip.	Extrusions, storefronts	3,000,000	20
Rolling and D.C. casting equip.	Extrusions, castings	10,000,000	44
Extrusion press	Curtain wall, doors, trim	4,000,000	14
More space, extrusion press	Music stands and lamps	150,000	15
Plant, roll forming equip.	Building accessories, roll formed shapes	2,000,000	33
Melting, extruding equip.	Entrances, storefronts, curtain wall	13,000,000	30
Roll forming equip.	Shutters, louvers, dampers	300,000	0
Increase finishing area	Windows, doors	2,000,000	33
Extrusion, metal finishing equip.	Screen doors & enclosures, ladders, roofing	2,000,000	33
Siding plant	Windows, doors, trim	12,000,000	71

A MEDIUM sized metalworking plant located in a small suburb of St. Louis bought approximately 1,500,000 pounds of aluminum sheet, extrusions and tube this year, and used the metal in manufacturing windows and doors for industrial, commercial and institutional buildings. The operations performed included cutting, stamping, welding and riveting, as well as cleaning, polishing, conversion coating, etching, anodizing and painting.

The plant manager sees a "good" business outlook for 1960, and believes the company's aluminum requirements will rise 33% to 2 million pounds next year. To take care of this increased volume, additional equipment will be installed for cleaning, etching and lacquering aluminum.

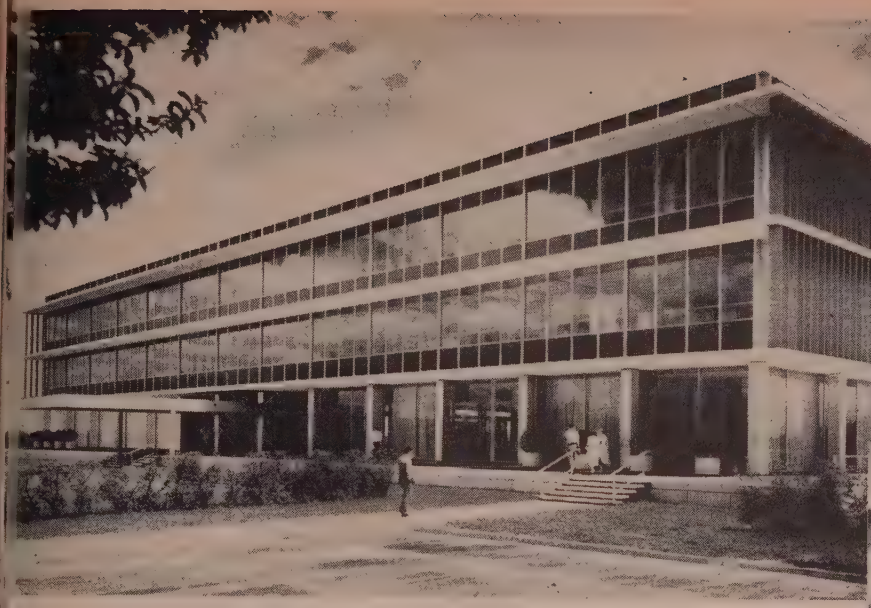
And Down in Miami . . .

Down in Miami is another concern that used 1.5 million pounds of aluminum in '59 and expects to consume 2 million next year. This one buys sheet, precoated sheet and extrusions, and performs such operations as riveting, cleaning, etching and anodizing in the manufacture of its screen doors, jalousie doors, ladders, screen enclosures and roof panels.

The prospects for 1960 also look "good" to the president of this firm, who reports that an extrusion press and metal finishing equipment are to be installed and that new products such as medicine cabinets and ladders will be brought out in 1960.

Though dissimilar in products made and markets served, these two widely separated companies have one thing in common: Each is a close approximation of the theoretical "average" among companies that responded to a survey questionnaire recently sent by Modern Metals to some 2000 plants that fabricate aluminum and/or use it in manufacturing end products.

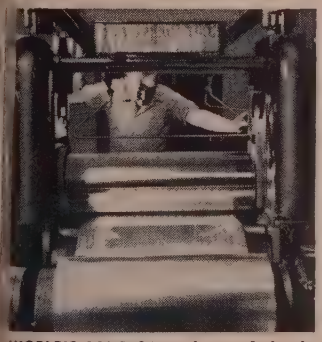
(*Continued on page 76*)



$11,500,000 BUILDING was completed in 1958, has won architectural acclaim. Many additions are planned, including a second office building, research center and product display building.

SPACIOUS COURTYARD of new Reynolds Metals Company General Office Building in Richmond, Virginia. The aluminum building has glass walls shielded by the world's largest system of automatic sun louvers also made of aluminum.

Internationally Known Reynolds Metals Company Makes Its Headquarters



WORLD'S LARGEST producer of aluminum foil, Reynolds Metals employs 3,200 people in the state. Five Reynolds manufacturing plants in Virginia have a total of 722,000 square feet. Its new plastics plant went into full operation in Grottoes, Virginia, in September of '59.

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ALUMINUM CONSUMPTION

Aluminum consumption in 1959 is estimated at 2.4 million tons, which is 35% above the 1.8 million tons consumed in 1958. Broken down, it is as follows:

Form	Tons
Sheet, plate & coil	750,000
Extrusions	500,000
Castings	400,000
Pig & ingot (other uses)	300,000
Wire & cable	130,000
Foil	125,000
Wire, rod & bar	100,000
Drawn tube	35,000
Forgings	26,000
Powder & paste	19,000
Welded tube	16,000
Miscellaneous & unclassified	50,000
Total	**2,451,000**

As of this writing (December 15) replies have been received from 369 plants. The 18% rate of response is not bad — especially considering the number and nature of the questions asked, plus the fact that no follow-up queries or personal contacts were attempted. It was a "one-shot" survey, conducted entirely by mail.

Our survey asked eight questions covering the following topics: Products made in which aluminum is used; amount of aluminum used in 1959; amount expected to be used in 1960; forms of aluminum purchased; expansion plans for 1960; new product plans for 1960; types of operations performed; and general outlook for the company next year.

The replies reflect a surprising degree of bullishness among companies that make everything from sheet, extrusions, castings, and other semi-fabricated forms, to an enormous array of consumer and industrial products. This optimism is manifested not only in predictions of increased use of aluminum, but also in plans for plant expansion and new products.

They'll Use 392,000 Tons

Getting down to particulars, fully 339 of our 369 respondents answered both questions concerning consumption of aluminum this year and next. Lumping together their estimates for 1959, we come up with a total of 590,196,026 pounds of aluminum consumed by these plants.

And if their expectations for 1960 prove out, these same 339 plants will chew up some 785,845,287 pounds next year. That would be a 33% increase. If one threw caution to the winds and projected this rate of increase for the industry as a whole, total consumption of aluminum would soar to 3.1 million tons next year (see front cover).

We need hardly add that such a projection is fraught with peril. For one thing, we must consider those 1631 firms that did not answer the questionnaire. It seems reasonable to assume that many were reluctant to turn in pessimistic reports. By the same token, some of those who did predict large increases next year may have been over-enthusiastic. (However, the questionnaire gave no incentive for "loading" the answers; complete anonymity was promised to all respondents.)

It is also true that the replies do not represent an accurate cross-section of the aluminum consuming industries. They are weighted too heavily toward the building industry; too lightly toward other major groups such as transportation, electrical and military. We believe that use of aluminum in building will rack up solid gains next year, while other markets (aircraft, for example) may use less aluminum.

But having acknowledged these negative factors, we still believe that the survey results represent a significant straw in the wind. We hear optimistic forecasts for many of aluminum's chief markets — appliances, autos and containers, for example — and the use of aluminum in these products is definitely on the rise.

20% Gain in '60 Possible

So, although the 33% increase indicated by our survey replies may be too much to hope for, we think that a 20% increase in aluminum consumption in 1960 is likely. That would run the total to 2,940,000 tons next year, setting a new record by a comfortable margin.

Getting back to our survey, we divided the replies into two groups — those using a million pounds or less in 1959 and those using over one million pounds. Fully 75% of the replies (253 plants) are in the first group, but they account for only 65,880,870 pounds (11.1%) of the '59 total. The remaining 86 plants account for 524,315,156 pounds, or 88.9% of the aluminum consumed this year by the firms that answered these questions.

The actual amounts reported by individual plants ranged all the way from 500 pounds to 35.5 million. The former, a Massachusetts firm that makes jigs and fixtures, expects to use 2000 pounds of aluminum next year. This would give it one of the largest *percentage* (400%) increases in the entire group. The latter, a well known aluminum building products manufacturer, expects its aluminum requirements next year to rise nearly 70% to 60 million pounds.

Probing between these two extremes, we find that 148 plants (43% of those that divulged their aluminum uses in '59) used from 100,000 to a million pounds this year. This probably comes pretty close to the "normal" range among all firms that use aluminum.

Delving a little deeper into this subject, we again divided these plants into two groups — this time into fabricators and product manufacturers. Only 58 of the respondents are in the fabricator group. Altogether they used 113,835,000 pounds of aluminum in 1959 and expect to use 146,344,000 pounds next year. That would be a 27.6% increase.

Product Firms More Bullish

The product manufacturers (308 plants) appear to be more optimistic. Altogether, they'll use 476,361,026 pounds in 1959, and expect to require 639,501,287 pounds next year. That would be a 34.7% increase.

While still on this subject, we calculated the percentage increase (or decrease) for each firm that answered both questions regarding aluminum consumption. We found that 99 expect to use the same amount next year as in '59, while nine actually expect to use less aluminum next year.

Among those that expect to use more, 101 will require from 21% to 50% more aluminum next year than in '59; 63 plants will need 50% more; and 59 will require from 10% to 20% more aluminum. Only eight will need less than 10% more aluminum next year.

METALWORKING OPERATIONS

By Companies That Answered Modern Metals Questionnaire

Operation	Firms
Cast	163
Extrude	150
Stamp	146
Rivet	127
Clean	118
Paint	117
Polish	113
Bend	108
Etch	83
Roll form	81
Anodize	78
Fusion weld	69
Heat treat	55
Melt	47
Resistance weld	45
Roll	31
Conversion coat	22
Tube draw	7
Machine	6
Draw	2
Spin	2
Forge	2

Of those who returned questionnaires, 37 did not answer this question.

Thus, about 43% of the firms that answered both questions on consumption used between 100,000 and one million pounds this year, and 48% will need anywhere from 10% to 50% more aluminum in 1960.

What They Buy . . . and Do

Replies to the question on forms of aluminum used brought no surprises. Sheet and extrusions are easily the most popular forms, being reported by 233 and 202 respondents, respectively. Fully 3 of the plants purchase ingot and/or billet, while 95 use aluminum tube, 75 buy castings, and 52 use precoated sheet.

Other forms reported include rod and bar by eight plants; roll formed shapes by five; foil by five; scrap by three; nuts and bolts by 2; and impact extrusion slugs by one plant. Only six of the respondents failed to divulge what forms of aluminum they use.

As for the manufacturing operations performed by our respondents (see table), it is interesting to note that 163 plants reported that they cast aluminum. This does not seem to jibe with the considerably smaller number (93) who reported buying ingot or billet. It is possible, of course, that some extruders reclaim their own internal scrap — and, perhaps, purchase scrap on the open market. But this alone could not account for the difference.

We can only conclude that many respondents simply failed to report their purchases of ingot. In fact, we noted this to be the case with some foundries.

Extrusion is the second most common operation (150 plants), with stamping or drawing close behind (146 plants). A surprising 127 plants do some sort of riveting, while 118 clean, 117 paint, and 113 polish aluminum.

Etching of aluminum was reported by 83 plants, while 78 anodize the metal. Among fabricating operations, bending is performed by 108 plants, while 81 make aluminum roll formed shapes. Rolling or rerolling operations are carried out by 31 of the plants. Fusion welding is done by 69 of the firms, resistance welding by 45, and some form of heat treating by 55.

113 Plants Will Expand

The bullish outlook for aluminum next year is perhaps best exemplified by the expansion or new product plans of the companies that answered our questionnaire. Better than half (210) of our respondents reported such plans.

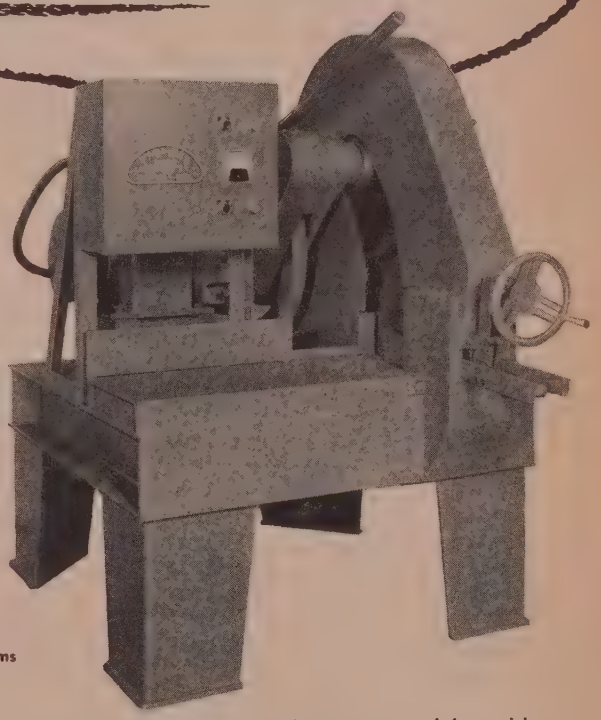
Additional equipment or entire new plants are planned by 113 firms. Many replies simply stated that a "new plant" would be built or that "new equipment" would be installed. Others were more specific, detailing the type of equipment that would be added (some typical examples are listed in the accompanying table).

Extrusion presses will be installed by 13 firms; finishing equipment by nine; melting and billet casting by six; foundry equipment by three; roll forming machines by three; and rolling equipment by three.

New product plans reported by 97 companies range all over the lot. Here are just a few: Curtain wall, windows and doors, carports, air cleaners, shingles, containers, appliances, tankers, awnings and shutters, outboard motors, irrigation couplings, portable hand tools, scaffolds, shell mold castings, residential roofing system, pool and boat ladders, storefronts, pontoon boats, and hospital beds. All of these will be made largely or entirely of aluminum.

Only 15 respondents failed to answer the question concerning the business outlook for 1960. Of the remaining 354 firms, 274 (75%) said that the outlook was "good." Another 35 firms considered the outlook "terrific," while 50 gave "average" as their answer. Only four reported a "poor" outlook.

New 30HP "CHOP" Saw Ends UNDERPOWER Problems



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Now . . . power *when* you need it—*where* you need it—with the radically new 30 HP "CHOP" Saw for wet or dry cutting. Advanced features include more powerful main motor, sealed-bearing spindle, timing belt drive, and a new dynamic suspension system that permits light fingertip feed without springs, counterweights or adjustments. Provides straight or variable-speed oscillating feed at option of operator. Screw-operated double vise quickly adjusts to handle up to 8" x 8" sections or solids.

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- Write Dick Pulliam, Modern Metals, Tribune Tower, Chicago 11, Ill. for details.

News Products and People

New Dump-Truck Design Uses Extruded Rails, Braces

An all aluminum truck and trailer dump body using extruded rub rails, top cap and side braces has been developed by the Penn Body Div. of Hockensmith Corp., Penn, Pa. The new method of construction is based on designs of F. C. Hockensmith, II, vice president.

Extruded rails and braces eliminated 40 bends previously required to form comparable components, and substantially increased the strength of the body. The extruded members are also easier to assemble, resulting in an overall savings in the cost of the dump body.

The trailer chassis is another new design using deep aluminum rails with cross braces of the same height dovetailed to the side rails. The 26-cubic-yard body weighs 8100 pounds. Another unit with an aluminum landing gear, weighs 7850 pounds.

Interesting feature of the dump body design is the use of side braces to spell out the trucker's name. Dump bodies are available with the extruded letters either gold or blue anodized with a natural finish aluminum sheet as a background.

Gold-Finished Aluminum Put to Many Uses

Aluminum specialty items ranging from fountain pen caps and appliance nameplates to costume jewelry are being made with simulated gold finishes produced by a new, inexpensive process developed by Shiraishi Laboratory Inc., Tokyo.

Called the Rheingold treatment, it can give aluminum any golden hue, or a silvery one, if desired.

Shiraishi claims the color will not change and that its brilliancy is permanent. The finish will not tarnish, is not affected by body perspiration and will not wear off like gold plating. It is resistant to heat, salt and vinegar, and can be subjected to boiling so it is suitable for kitchen utensils.

Some of the products now being produced are brightly finished pen and pencil caps and appliance nameplates to dress up other products. One round tray has a brilliant yellow-gold finish and a hammered bottom. Other trays have smooth surfaces with engraved line drawings and contrasting areas.

Costume jewelry includes white gold finished bracelets with lightly hammered surfaces and wide platinum-hued items with ornate flowered designs accentuated by ridged edges and roughened areas. One pin is inset with small stones and is painted black in parts to add to its attractiveness.

Alumina Vital to Tiny Electronic Components

The versatility of alumina will bring to the market within a few years pocket-sized record players and powerful radios no bigger than a pen, according to Alcoa. The company is supplying alumina to several ceramic manufacturers for use in tiny blocks designed to contain all the elements of a complete electronic circuit.

Micromodules, as the blocks are called, are ⅜ of an inch square, but contain circuit elements so thin that as many

340 will fit into a single cubic inch. ny of the miniature elements are unted on wafers of alumina 3/10- h square, and 1/100-inch thick. A cromodule is formed by combining group of elements, and then interinecting them.

Micromodules act as amplifiers, oscilors, resistors, capacitors and other ctronic components. Ceramics made 96% alumina are used as the basic ilding material because of their meanical strength, thermal stability, ner basic electrical properties, and ility to be produced in huge quantis. The wafers can be metallized so ch miniature element can be hertically sealed.

Aluminum Supermart erves Decatur, Ga.

Aluminum Sales and Service Inc., 109 N. Decatur Road, N.E., Decatur, Ga., is providing its selling area with luminum products of all types, with ales ranging from jalousie screws to omplete installations of siding and gutters.

H. Edson Hicks, president of the 15-nonth-old firm, says his purpose is to provide the missing retail link between he aluminum product manufacturer nd the buying public.

"With thousands of aluminum pre-fab homes being built each year, and thousands more incorporating more and more aluminum items, there will be an increasing need for competent sales and service organizations to serve these homeowners," Hicks pointed out.

Items stocked include all types of home building products, items for use in the home, and a variety of do-it-yourself kits.

Hicks feels his type of operation fills a big retail need, but says he is limited by the number of aluminum products he is able to obtain. He says he needs access to more and better aluminum products for the American home-owner.

Noral Exhibits Aluminum Siding, Roofing

Northern Aluminium Co., Banbury, Oxfordshire, England, exhibited Snaprib, its aluminum building sheet for roofing and siding, at Britain's recent Building Exhibition.

This aluminum sheet has the metal's usual advantages — thermal reflectivity, durability, light weight — plus a method of concealed fixing which ensures weathertightness and good appearance. Span houses shown above, in Blackheath, London, have Snaprib roofing.

Other Noral siding includes deep trough industrial sheet for long spans, thin-gauge shallow-troughed sheet for internal lining, and standard sheets. Finishes include porcelain enamel, as well as anodized sheet.

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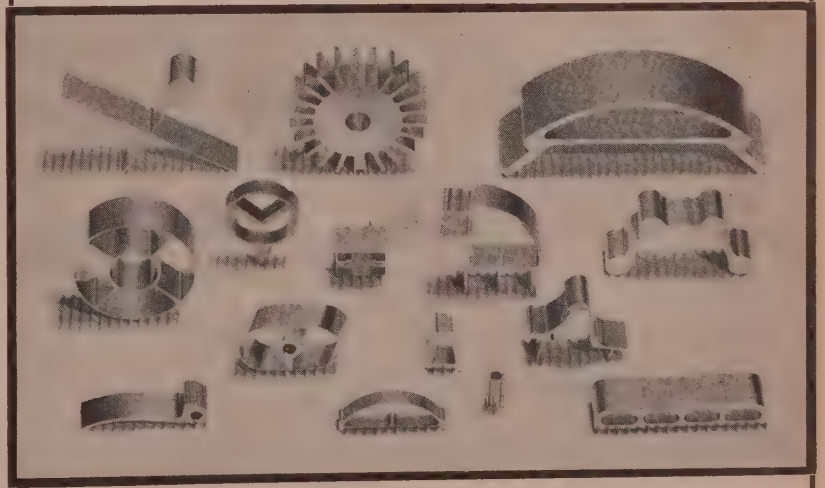

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First Integrated Home Siding Plant in Canada

Hunter Douglas Ltd., Montreal, says it will start immediate production of aluminum clapboard siding for the housing industry, marking the first time such siding has been produced in Canada on a fully integrated basis.

Douglas estimates the aluminum siding sales potential per year in Canada at $11,000,000. To get its share of the market, Douglas will franchise distributors and dealers immediately. In addition, the firm's marketing organization is planning a thorough advertising campaign and several training programs.

The product, known as Flexalum Color-Cote, was entirely developed by Douglas personnel, and will use all Canadian products in its manufacture.

Precision Techniques Used in Forming Telescope Parts

E. W. Bliss Co. is building a 140-ft. radio telescope for Associated Universities Inc. to be set up at Green Bank, W. Va., as part of the National Radio Astronomy Observatory.

As contractor, Bliss is responsible not only for fabricating telescope parts, but also for erecting it and placing it in operation. The project's size, and the need for precision, created many metalworking problems.

To solve these problems, Bliss' Canton, Ohio, plant has employed many devices. Examples: Machine tools are aligned with a precision theodolite; a 42½-ft. aluminum television mast is used in cutting operations; dual-headed welding units are mounted over an open pit so they can be swung to any point above it (see picture). Almost

half an acre of aluminum plate is wai ing to be formed into the 15,000-squar foot parabolic "dish" of the researc instrument.

This dish is what actually gathe the spatial radio waves emitted fro solar bodies. With its 140-foot diamete the dish has a total area of about of an acre, yet can vary from perfe paraboloid shape by no more tha 1/16 of an inch.

To form the aluminum plates wi such perfection, Bliss will use epo dies, and has already developed son special forming techniques for the jo

The framework and supporting stru ture of the reflector will be assemble on the ground and then raised — as 350-ton unit — more than 150 feet in the air to be mounted on the yok The yoke, the biggest single unit in t telescope, contains close to 2½ millio pounds of steel, concrete and balancin blocks.

Titanium Electrorefined With Internally-Heated Cel

The U. S. Bureau of Mines, Depar ment of the Interior, has developed a internally heated cell for electrorefinin titanium.

In a report of its continuing researc on titanium, the Bureau says that su cessful studies with the improved ce have prompted its scientists to inclu additional experiments on internal hea ing in large units.

Previously, an externally heated fuse salt electrolytic cell for refining offgra titanium sponge and scrap was dev oped, but its exterior wall deteriorat too fast. In the new units, the simp constructed internal heating eleme operates more efficiently, and great reduces scaling of the cell's exterior.

Report of Investigation 5494, "Ele trorefining Titanium, Using an Int nally Heated Cell," can be obtained writing Publications - Distribution Se tion, Bureau of Mines, 4800 Forbes Av Pittsburgh 13, Pa.

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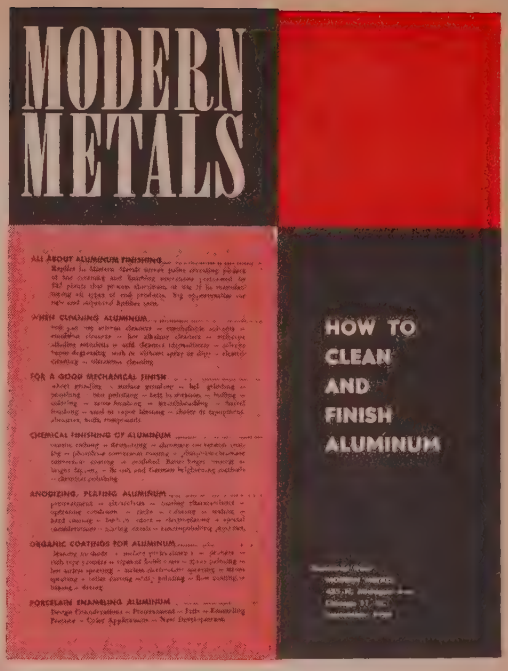

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wheel grinding — surface grinding — belt grinding — polishing — belt polishing — belt lubrication — buffing — coloring — satin finishing — scratchbrushing — barrel finishing — sand or vapor blasting — choice of equipment, abrasives, buffs, compounds.

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caustic etching — desmutting — chromate conversion coating — phosphate conversion coating — phosphate-chromate conversion coating — modified Bauer-Vogel process — bright dipping — British and German brightening methods — chemical polishing.

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pretreatment — electrolytes — coating characteristics — operating conditions — racks — coloring — sealing — hard coating — built-in colors — electroplating — special considerations — plating metals — electroplating processes.

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Forged Wheels Cut Weight of New Army Tank

Bridgeport Brass Co., Adrian, Mich., is producing aluminum forged wheels for the U. S. Army's new battle tank, the M-60. A special technique was developed to produce ribs in wheels as an integral part of the forging.

Road wheels weigh approximately 80 pounds, idlers 13. After forging, wheels are shipped to the Chrysler Plant i Center Line, Mich., where they a machined and coated with a rubb tread.

The M-60, said to be the most dead tank yet developed, will replace th Army's medium 53-ton (M-48) an heavy 60-ton (M-103) tanks.

Alcoa Expands Production of Weldable Alloy Sheet

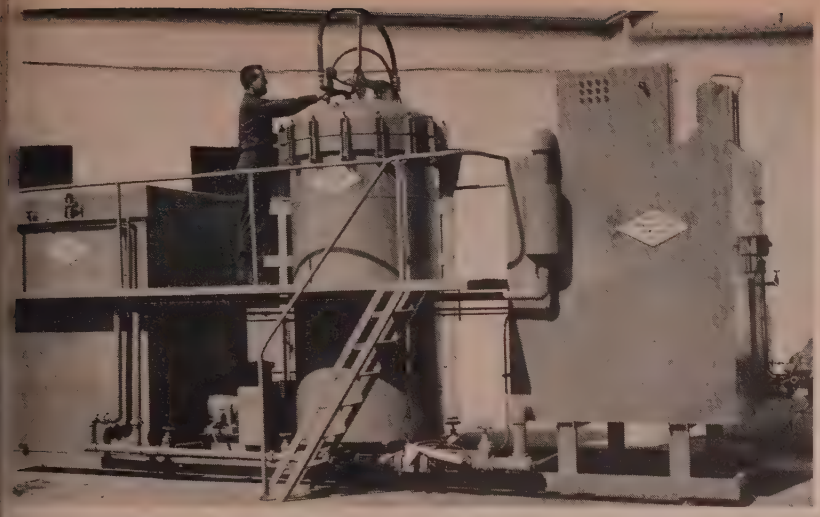
Sharply rising demand for strong, easily welded aluminum sheet for use in missiles, ships, trucks, storage tanks and structural applications has caused Aluminum Co. of America to step up production of sheet from alloy 5456. It is the highest strength composition available in the readily weldable aluminum-magnesium alloy series.

First introduced in plate gauges only (.250-inch minimum thickness), 5456 now is rolled in thicknesses ranging from .051 to 2.00-inches, Alcoa reports. Mechanical properties, tempers, and fabricating practices for the new, high strength sheet have been established by Alcoa after extensive development work. Minimum guaranteed tensile properti are shown in the accompanying tabl along with those for alloy 5083, said t be the second strongest aluminum-ma nesium alloy now available in shee form.

Alcoa developed the —H24 an —H321 tempers to combine good resis ance to stress-corrosion with a hig level of mechanical properties an greater tolerance for cold working such as cold forming — in alloys 545 and 5083. For given tensile properti plus high resistance to stress-corrosio cracking, best results are achieved b using alloy 5456 in the —H24 or th —H321 temper, the company said.

Minimum Tensile Properties for 5083 and 5456 Alloy Sheet

		5083			5456		
Temper	Gauge	KSI TS	KSI YS	% EL	TS KSI	YS KSI	EL %
—O	.051-.125″	40	18	16	42	19	16
	.126-.249″	40	18	16	42	19	16
—H321	.126-.249″	44	31	12	46	34	12
—H32	.051-.125″	---	---	---	---	---	---
	.126-.249″	45	34	8	---	---	
—H34	.051-.125″	50	39	6	---	---	---
	.126-.249″	50	39	8	---	---	---
—H24	.051-.125″	47	35	9	51	39	9
	.126-.249″	47	35	9	51	39	9



Impregnation of Castings Done on Production Line

A new custom-built rental unit for production line impregnation of aluminum automotive transmission housing castings has been produced by Prenco Mfg. Corp., Royal Oak, Mich.

The unit was designed specifically for use with metal oxide type sealing materials. It consists of an 850-gallon sealant supply tank, a sealant agitator, an autoclave and a 1000-gallon rinse tank, together with sealant heating system, vacuum pump and electrical and hydraulic piping and controls. A separate electronic control panel automatically phases the impregnation cycle, and includes an electrical interlock system which prevents entry of liquid sealer into any part of the vacuum system.

Built as a package unit, the equipment is moved and installed as a complete unit, without disturbing individual components.

This Prenco equipment is designed to operate two shifts a day, impregnating 70 large castings an hour. At this rate for 20 working days each month, the total rental cost is less than 2 cents per casting, the manufacturer reports.

Aluminum, Wood Combined in New Window

The maintenance-free advantages of aluminum and the insulating qualities of wood have been combined by the Jervis Corp., Grandville, Mich., to form Wood-A-Lume, a window with the decorative qualities of wood on the inside and the durability of aluminum on the outside.

Wood-A-Lume can be integrated with any type of construction, the window becoming part of the wall. A prepunched aluminum jacket and studs aid quick installation.

Windows are made in casement, awning and picture window styles, with the wood interiors coming in various colors. The anodized aluminum exterior needs no painting.

The standard size windows are fully weatherstripped, accommodate all types of glass, and are equipped with self-storing vinyl storm sash and copper-toned screens.

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Giant Aluminum Tank Car Transports Acetic Acid

General American Transportation Corp., Chicago, has built, and delivered to Celanese Chemical Co., Pampa, Tex., a 20,000-gallon capacity aluminum tank car — said to be the largest car built with the light metal.

This is the first of 50 such units American is building for Celanese, who will use them to transport acetic acid used in many consumer and industrial products.

Aluminum tank car construction of such size marks an important step forward for the lading industry. Steel cannot be used to hold many chemicals because they attack steel or the metal contaminates the chemicals. Such problems are eliminated with aluminum because of its non-contaminating qualities.

The car is 56 feet long, 10 feet wide and 15 feet high. It weighs 68,000 pounds, which is 4,300 pounds less than a comparable steel car would weigh.

Tanks have a 4-inch glass wool or fiber glass blanket of insulation. Twelve aluminum coils are installed in the car so the fluid can be heated for easier unloading.

Unique in the car's appearance is the absence of the familiar dome usually seen on tank cars, and which allows for expansion and contraction of the cargo. The new car has enough space within the tank itself to allow for this.

Tanks can be unloaded from the top as well as the bottom.

Reynolds Occupies New Regional Building

Reynolds Metals Co. used more than 212,000 pounds of aluminum in constructing its recently opened Great Lakes Region sales headquarters in Detroit.

Minoru Yamasaki designed the three-story, air-conditioned, $2,000,000 building. One of the most unique applications of aluminum to the building was the gold anodized sun screen covering the second and third stories on all four sides.

The screen, which used the bulk of the aluminum, consists of rings 10 inches in diameter and 2¼ inches deep. They are mechanically locked together in a pattern permitting unobstructed vision from inside the offices they protect. More than 125,000 pounds of aluminum was used to "weave" the screen.

Aside from the sun screen, aluminum was used, among other applications, in railings, doors, gratings, duct-work, grilles, registers, heating and air conditioning systems, furniture and a skylight which brightens the building's interior. This skylight used approximately 14,000 pounds of aluminum and arches 50 feet overhead.

New Aluminum Alloys Used in Missile Production

Two new aluminum alloys are being used by North American Aviation Corp., El Segundo, Calif., in the production of jet aircraft and missiles.

The A3J Vigilante — the U. S. Navy's attack-bomber — is the first aircraft to have a lithium-aluminum alloy skin. More than 4200 pounds of X2020 plate is used in the Vigilante.

Lithium, lightest of all the metallic elements, endows Alcoa alloy X2020 with a 3% weight saving over conventional aluminum compositions developed for aircraft use. It also maintains high strength at up to 400°F.

North American's use of alloy X2020 shaved 168 pounds from the total weight of the plane. The plate is milled into thin sheet to form skin for the inboard wing-sections — from wing root to wing-

lding joint — and the horizontal stalizer.

Lithium also increases the modulus elasticity to some 8% greater than r standard aluminum alloys. Thus, orth American is able to increase eight savings by milling X2020 plate nto thinner sheet than is usual with ther aircraft alloys, and still meet rength requirements.

North American has also received patent covering Tens-50, an aluminum lloy which can be cast to the high trengths needed for advanced missiles nd aircraft.

The alloy was developed to avoid the estrictions of the conventional "high urity" approach to high strength luminum castings. Few foundries could ndertake the expensive procedures ecessary to achieve acceptable castings rom non-contaminated aluminum alloy.

An important addition to the new lloy's composition is a small amount f beryllium. Ordinarily, during melting and pouring of metal in the casting process, iron impurities are picked up and the casting becomes brittle. In the new alloy, the iron picked up is modified by the beryllium and casting's strength is unimpaired.

Automotive pistons, high pressure valves, compressor bodies and major engine, missile and aircraft components are now being produced in the new alloy.

DC-8 Jetliner Uses Half-Ton of Titanium

A half-ton of titanium is used in the airframe of the 585-mph Douglas DC-8 jetliner, representing the most significant use of titanium by a commercial airplane in areas other than jet engines.

United Air Lines, the first to fly the new ship, estimates the weight saved by titanium is equal to a half-ton of cargo. At mail rates this amounts to a potential earning of $525 for each coast-to-coast flight.

Titanium is used basically in rip stoppers and engine pods. Rip stoppers are bands of Ti-6A1-4V titanium which are riveted at 18-inch intervals around the circumference of the forward section of the fuselage, as above, in a fail-safe pattern. Since the metal is crack resistant, these stoppers guard against sudden depressurization during flight.

Commercially pure titanium grade Ti-75A is used in engine pods. The metal resists short-time temperatures up to 2000°F, at a weight savings of more than 500 pounds. Titanium Metals Corp. of America, New York, supplied the metal used.

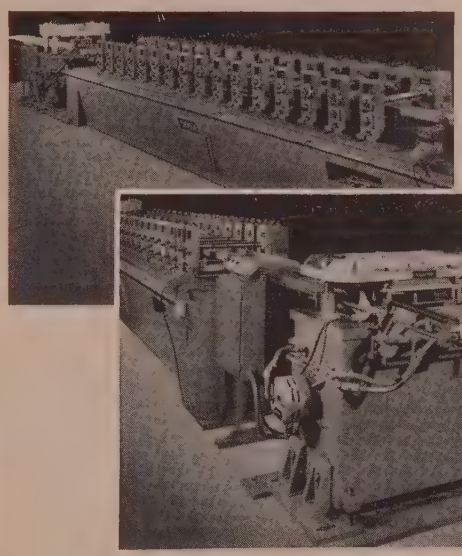
Use of titanium in the DC-8 illustrates recent advances in fabrication and brings into perspective the cost differences associated with such construction.

Ryan Aeronautical Co., San Diego, which fabricates the bulk of the assemblies for the pods, has developed techniques of welding and machining titanium at costs roughly equal to fabricating steel.

Railroad Box Cars Lined With Aluminum

Fifty Baltimore and Ohio Railroad box cars have been lined with aluminum to overcome the major drawback of conventional wood linings — breakage caused by fork lift trucks and shifting loads.

Car linings are produced by Alcoa. The aluminum car walls are spark proof,



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will not retain odors and do not require protective coatings. A 42-inch-high extruded lining installed in a standard 50-foot, 6-inch box car with 15-foot doors, weighs only 1150 pounds.

The lining has tongue-and-groove extruded 6063-T6 panels designed to fit into ordinary tongue-and-groove wood linings. There are no projections in the lading space, and no special clips or fasteners are required.

All panels are 8⅝ inches wide. Bottom sections, where most impact occurs, are ¼-inch thick, with intermediate sections 3/16-inch and top sections ⅛-inch thick. Panels are designed so that maximum span of unsupported flat area is less than 4 inches.

To aid maintenance, side panels can be removed from the bottom. A special starter strip is available for end linings. Fastened at the car's centerline, it divides end lining in half for easy replacement if damaged.

Aluminum Engine Container Wins Air Force Award

A pressurized, shock-mounted, stackable aluminum container for shipping vernier rocket engines has won Harvey Aluminum, Torrance, Calif., a United States Air Force Award.

The container, built by Harvey, won first place for the best USAF-industry developed package at the recent Air Materiel Command Packaging and Materials Handling Conference at Oklahoma City. The unit was jointly designed by Henry Roe, Weapons Transportation Division, San Bernardino Air Materiel Area; Milton Peterman, Ron Nelson and K. D. Miller, Rocketdyne Division, North American Aviation Co., Van Nuys, Calif., and Harvey engineers.

Of modular design, to permit capacity variations, the containers are built with integrally stiffened aluminum extruded skin panels, welded into cover and bottom assemblies. The re-usable unit has replaced five different heavy metal packages of various sizes and shapes.

Lawn Umbrella Folds For Easier Shipment

A lawn umbrella that opens and closes by turning a crank is a new product of Macon Umbrella Corp., Brooklyn, N.Y. It also has a simple tilting mechanism.

Macon's new model is made of a series of rigid sections of pre-coated aluminum sections in non-peeling colors. Peak venting allows heat to escape, creating a 20% cooler shaded area.

"Of major importance is that this umbrella eliminates the bulky shipping and storage problems," said Alfred G. Cohen, president of Macon. "It has also eliminated costly installation and maintenance charges that have plagued retailers and hotel and resort owners when handling the conventional rigid type."

The new design earned for Macon the 1960 Apollo Award for "Excellence in Summer Furniture Design and Engineering," the second time Macon has won this distinction.

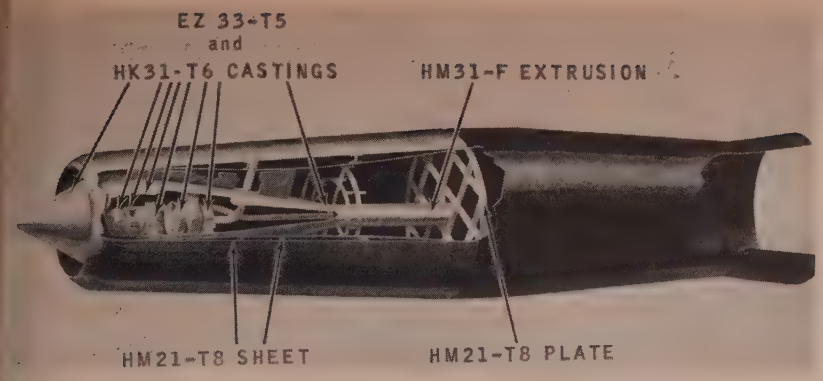
Aluminum Armor Plate Tested on Firing Range

Ballistic testing of aluminum armor plate is being conducted on a new firing range established by Kaiser Aluminum and Chemical Corp., in conjunction with the Army's San Francisco Ordnance District, at Kaiser's Department of Metallurgical Research, Spokane, Wash.

The facility, said to be the first of its kind in the aluminum industry, will be used to test armor plate Kaiser supplies to manufacturers of ordnance vehicles and for development studies at the research laboratory.

All facilities, including the projectile track, are completely enclosed and soundproofed. The range is equipped to measure velocity of ballistic projectiles and special safety and security devices.

Armor plate is produced from 5083 alloy and is used for lightweight, air-transportable combat vehicles.



Magnesium-Thorium Alloy Used in Jet Engines

Virtually the entire diffuser section of one of the Marquardt Corp.'s ramjet engines used in the Bomarc missile is constructed of magnesium-thorium alloy sheet, plate, castings and extrusions.

External and internal skins of the section are made of HM21A-T8 alloy, chosen for its high strength-to-weight at elevated temperatures. Alloy HK31A is used in sheet form for nose cones, longerons and diffuser innerbody.

Also, HK31A and EZ33A castings are used in the control system for the fuel pump housing, the air turbine inlet ducts, the mach sensor and shock positioner housing and fuel inlet. Throughout the engine, about 60 castings are used totaling more than 300 pounds.

Fire-Resistant Wall Developed by Mahon

Four years of combined research and field testing at the Building Products Division of The R. C. Mahon Co., Detroit, have made available to the building industry five basic types of steel or aluminum faced curtain walls with fire-retarding capabilities ranging over three hours.

The firm says the new designs make metal siding construction available for previously forbidden applications such as warehouses, elevator and air-conditioning buildings, and special projects such as exterior overhead walks or passageways.

The new firewall designs include many shapes which blend in with insulated metal walls already on the market.

Underwriters Laboratories Inc., Chicago, determined the fire-retarding capabilities of the walls using tests in accordance with specifications of the American Society for Testing Materials.

Conventional walls use glass fiber insulation, but the new designs use a core of ½-inch gypsum board layers between aluminum or steel faces. Panels are assembled on the job with mechanical fasteners, and all are suitable for Factory Mutual insured locations as non-bearing fire barriers, says Mahon.

The aluminum and steel facing units employed in each design are 18-gauge, but can be heavier. In some instances, galvanized or painted steel sidewall or deck configurations may be used for either or both faces, with ribs and flutes placed inward or outward. The fire-retarding capabilities are increased by the layers of gypsum board — four layers for the 2-hour rating, and five for the 3-hour.

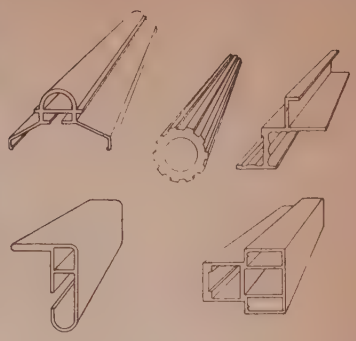
David J. Dugan, Mahon vice president, says that the U. S. market for insulated and other types of metal curtain wall in non-residential construction is barely tapped. His firm estimates that the market represents a yearly volume in excess of $100 million.

Green Houses Built From Do-It-Yourself Kit

Aluminex Inc., 2408 Forney St., Los Angeles, has developed two green house styles of all-aluminum construction.

One package offered by the firm is a do-it-yourself kit for a green house 9 feet wide and 8 feet high. It can be made in any length in multiples of 2 feet ½ inch. All glass is cut to size as are vinyl H strips for weathertight joints. Aluminum sections come prefabricated and are easy to erect.

Aluminex also has materials needed for making large-scale green houses. Units can be made from 15 to 35 feet wide, from to 10 to 14 feet high, and in any length that is a multiple of 10 feet 2½ inches.



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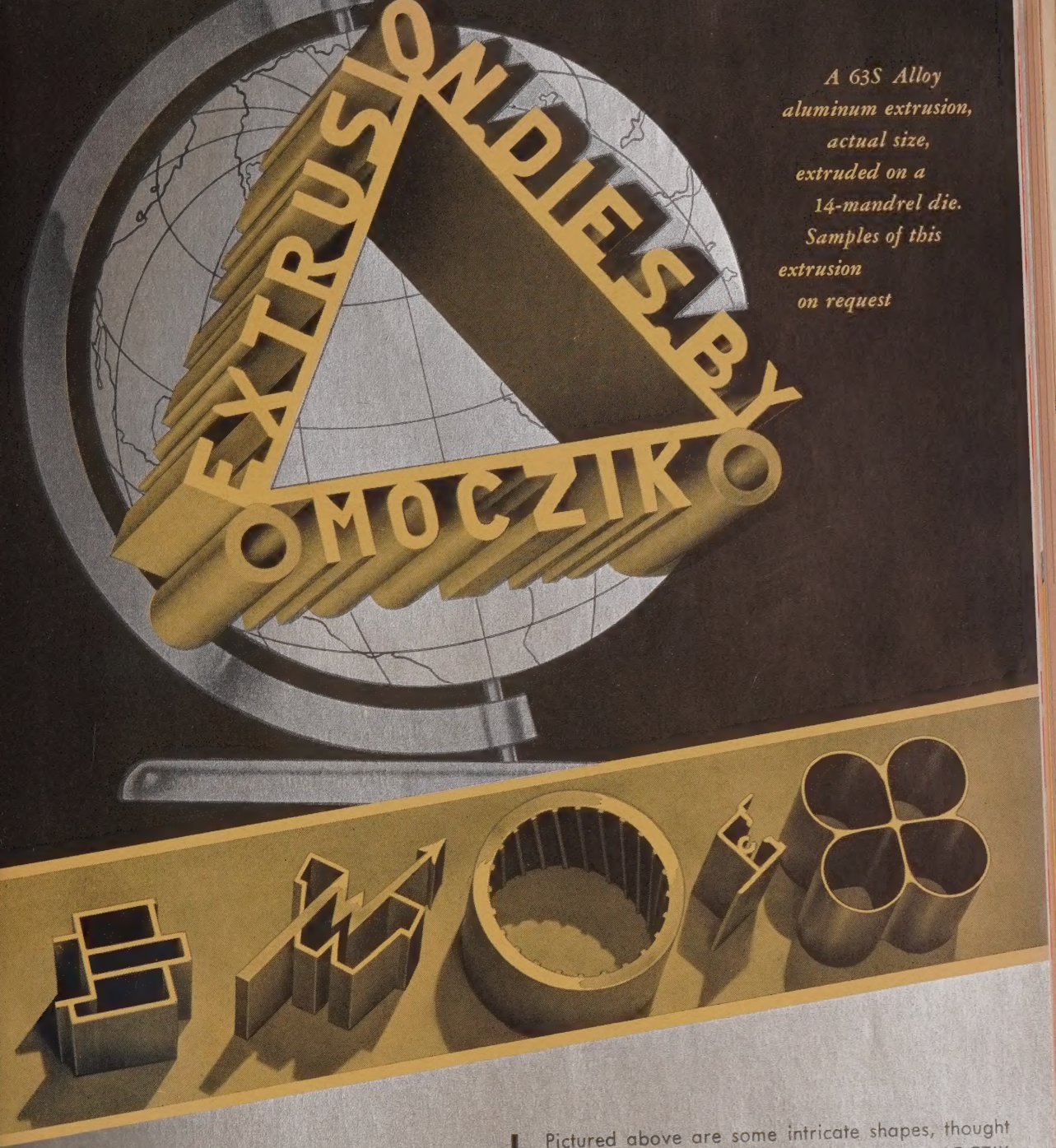

A 63S Alloy aluminum extrusion, actual size, extruded on a 14-mandrel die. Samples of this extrusion on request

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Looking Ahead

No doubt about it, 1960 will be a great business year. Nearly all signs point up, as revealed by our recent survey of over 2000 aluminum users (see cover and page 74). We cannot believe that aluminum consumption will jump 33% in 1960, as the survey replies indicate, but users could handily chew up more aluminum than has been used in any previous year. Our guess: Somewhere between 2.7 million and 3 million tons of aluminum will be consumed next year.

By way of contrast, aluminum sales have been weak in December; buying for January has been skimpy. Some observers blame it on over-sized inventories, but we find consumers stocks of aluminum only 5% higher than normal. Uncertainty over steel supplies is a more likely reason. Despite what you hear, big users such as General Motors will be begging for more steel until spring. Aluminum demand will start to edge up only when big users get more steel. The aluminum industry has discovered in the past three months that its volume is perhaps too dependent upon the availability of steel.

But February should see aluminum demand edging up. Come March, more potlines may be activated to take care of spiraling demand. The second and third quarters of 1960 could well be record busters for aluminum, and the hot pace might easily continue into the fourth quarter. One big "if" – how well building and construction activity bounces back next spring.

Up in Canada, Aluminium Limited already senses the coming upturn on a global scale. Limited's big Alcan subsidiary has steadily stepped up its production rate in recent months to the point where its plants are now running at around 77% of capacity; has plans for still another increase. Main reason: Major users abroad are buying more aluminum than in the past several years.

In France, for example, Pechiney is reported to be "sold out" for a year as far as its aluminum business is concerned. The big aluminum and chemicals producer's exports jumped 50% in the first ten months of '59. Its aluminum production in France rose 4%, while output at the new Cameroons (Africa) facility rose 43%. Domestic demand for aluminum has been so strong that measures have been taken to rush completion of Pechiney's new primary smelter at Lacq. Capacity will be 56,000 tons annually.

Japanese production of both aluminum and aluminum rolled products set new postwar records in September. Output of primary metal in the first nine months totaled 73,568 tons – 20% higher than the total for the same period last year. Some 8467 metric tons of aluminum rolled products were produced in September, and domestic shipments of rolled products topped off at 8266 metric tons. Domestic demand is running so high that Japanese rolling mills have urged the Ministry of Trade to authorize imports of 3000 tons of primary aluminum – this in addition to the 9600 tons already authorized.

Aluminum imports and exports: Aside from Aluminium Limited, the Canadian producer which sells up to 300,000 tons of aluminum pig and ingot in the U. S., no foreign firm sells much aluminum in this country. However, imports of sheet, rod, etc. from Europe jumped from 19,000 tons for the first nine months of 1958 to nearly 38,000 tons in the same period this year. Prices are about 15% under domestic levels. When low-priced building sheet and duct sheet were brought out last month, imports sagged noticeably. European fabricators suddenly lost interest in the U. S. market. Also, booming demand for aluminum in other world markets has transferred their sales strategy to closer markets. At the same time, U. S. firms are exporting more aluminum. For the first nine months of 1959, exports totaled 62,500 tons as against 21,000 tons last year.

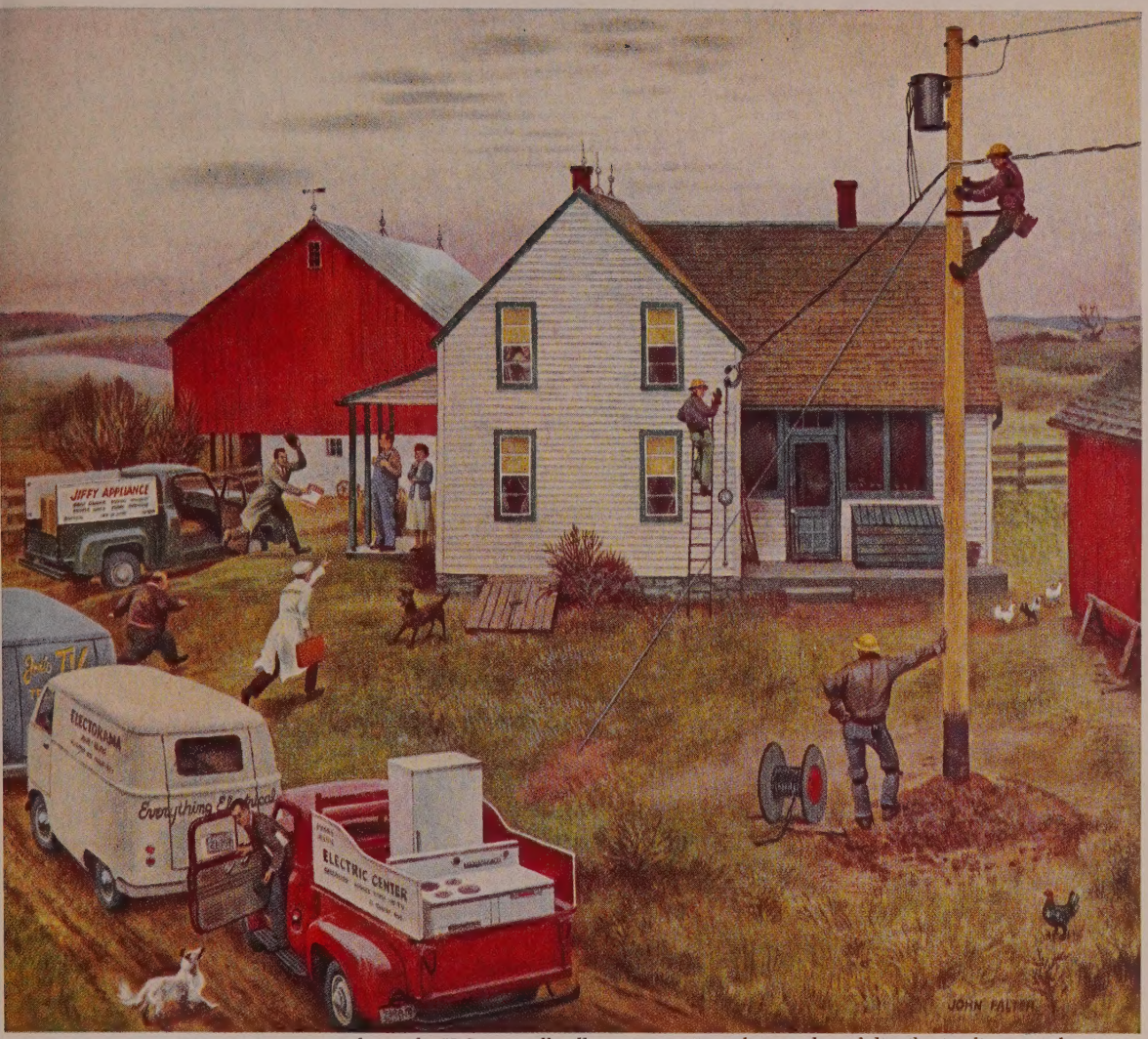
Cars will be coming off the lines at a rate of 150,000 a week in January, or a rate of 7 million per year – if auto companies can get the steel. Demand is spectacular, auto men say, although Chrysler products aren't moving as fast as most other makes. U. S. Commerce Department says 1960 car production will be 6.7 million units – 22% over this year. If auto sales hit 6 million, it will be a helluva year. If so, and if the Corvair continues to sell well, automotive aluminum consumption should top 250,000 tons.

Increasing demand and low earnings encouraged Aluminium Limited to boost the price of aluminum ingot by ¾c a pound this month. Its new price, everywhere but in the U. S., is equivalent to 23¼c a pound in U. S. money. Limited also hiked the prices of semi-fabricated aluminum 3½% in world markets. The overseas sales subsidiaries of U. S. producers disclosed that they would match Limited's world prices.

Then Alcoa announced that, effective December 17, it would raise the price of aluminum pig 1.3c per pound in the U. S. This restores pig to the 26c level that prevailed prior to the April 1958 price cut. The following day, Reynolds and Kaiser adopted the 1.3c increase, and Aluminium Limited Sales, Inc. brought its U. S. price in line with the new level. At the same time, smelters hiked the price of secondary ingot by 1¼c a pound.

New aluminum wage contracts were virtually wrapped up as we went to press. Observers believe it will be a modest increase – one that the steel industry may try on for size before the end of the year. It now appears that both sides are out to settle by January 1st. So there might be peace – and a prosperous new year rolling in.

– The Editors



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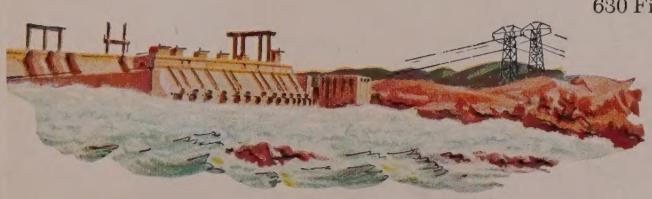

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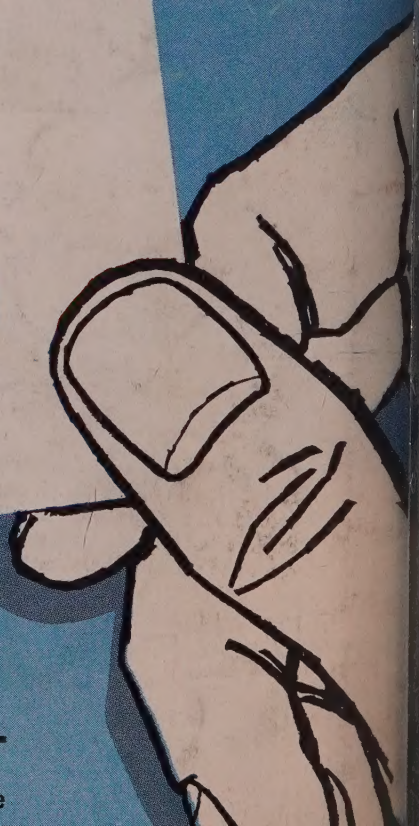

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